DOCUMENT RESUME

ED 130 571 HE 008 332

AUTHOR Spies, Richard R.
TITLE The Future of Private Colleges. The Effect of Rising Costs on College Choice.
INSTITUTION Princeton Univ., N.J. Industrial Relations Section.
PUB DATE 73
NOTE 80p.
AVAILABLE FROM Industrial Relations Section, Princeton Univ., Princeton, N.J. ($3.00)

EDRS PRICE MF-$0.83 HC-$4.67 Plus Postage.
DESCRIPTORS College Admission; *College Choice; College Entrance Examinations; *Costs; Economic Research; Educational Alternatives; Educational Demand; Educational Finance; Enrollment Trends; *Family Income; *Higher Education; *Private Colleges; Socioeconomic Status; Statistical Data; Student Attitudes; Student Costs; *Universities
IDENTIFIERS *Scholastic Aptitude Test

ABSTRACT

A survey was conducted to examine the behavior of students as they decide where to go to college; in particular, the effects of financial considerations on their decision are examined. Admissions data from a group of select private colleges and universities are described along with trends in admissions at these schools. A random sample of parents of high school seniors who took the College Board examinations in the 1970-71 academic year and achieved a total score of at least 1100 on the SAT's was taken regarding the basis of their children's application decisions. The SAT scores are analyzed in relation to family income and college costs. The main conclusion drawn from the economic analyses is that, of the variables explored, educational considerations are the primary determinants of college applications. Students try to find schools that closely match their own academic abilities; financial considerations are only secondary. Neither cost nor income has much effect on applications, although both are statistically significant. The implications of this conclusion for the private colleges and universities are discussed and projections of the effect of future cost increases for this select group of institutions are made. (JMF)

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THE FUTURE OF PRIVATE COLLEGES

THE EFFECT OF RISING COSTS ON COLLEGE CHOICE

BY

ICHARD R. SPIES

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HE 008 332

INDUSTRIAL RELATIONS SECTION
PRINCETON UNIVERSITY

The Future of Private Colleges

THE EFFECT OF RISING COSTS ON COLLEGE CHOICE

BY

RICHARD R. SPIES

1973
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INDUSTRIAL RELATIONS SECTION
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Research Report Series No. 117

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FOREWORD

For at least the last five years there has been great concern that the rising costs of attending private colleges and universities are discouraging significant numbers of students from applying or accepting admission. With increasing frequency, presidents, trustees, faculty members, public officials, and others committed to the future of private higher education—indeed, to the health of our whole system of higher education—have been asking if rising tuition rates are not "pricing us out of the market." The obvious importance of the question notwithstanding, there has been little systematic research directed to answering it. All too often, anecdote, myth, and speculation have substituted for an assessment of evidence—not because of an unwillingness to look at evidence, but because there has been so little evidence available.

In this monograph, Dr. Richard R. Spies, Assistant Provost at Princeton, begins what we hope will be a continuing series of studies of this question. His research design is notable for the fact that he collected new data specifically for the purpose at hand, data that have permitted us, for the first time, to relate the economic circumstances of the applicant and his or her family to two separate decisions: to which group of schools to *apply* and which one school to *attend* from among those offering admission. In the course of his work Dr. Spies has also examined the effects of measures of academic aptitude and a host of other noneconomic factors on this same set of decisions.

The results of this analysis, and the accompanying examination of some historical evidence, suggest that, so far at any rate, financial considerations per se have had surprisingly little effect on the college choices of students with relatively high academic aptitude (the group examined intensively in this study). "Educational considerations," broadly defined, are shown to be far and away the major determinants of the decisions made by this group of applicants. We should emphasize that this does not mean rising tuition charges constitute no problem. Rising charges pose serious problems from many perspectives (especially from the perspectives of some students and their families), and these problems may

become even more serious for the private colleges and universities in the next decade or so as the rate of increase in the number of applicants declines significantly. Still, one important lesson to be learned from this study is that we ought not exaggerate the effects of rising tuitions charges, lest we fool ourselves as well as others.

WILLIAM G. BOWEN

Princeton, New Jersey
February 1973

ACKNOWLEDGMENTS

THIS study was conducted under the auspices of the Office of the Provost of Princeton University as part of a larger study, underway at Princeton for the last four years and supported by the Ford Foundation, of various problems of budgeting and resource allocation. I am particularly grateful to President William G. Bowen, who, as Provost, provided me with constant encouragement and advice. The national survey was supported by a grant from the Alfred P. Sloan Foundation and was conducted by the Opinion Research Corporation. In drawing the sample for that survey, we received both technical assistance and financial support from the College Entrance Examination Board and the Educational Testing Service. I wish to thank all these organizations for their support.

Among the many people who have made helpful comments and suggestions during the course of this study are Professor David F. Bradford, Professor Marvin Bressler, Mr. Timothy C. Callard, Dr. William W. Lewis, and Mr. James P. Mnookin, all of Princeton University, and Dr. Michael A. Rappeport of Opinion Research Corporation. Finally, I would like to thank Mrs. Velga Stokes and Miss Evelyn Thompson, who typed and edited several drafts of the manuscript.

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INTRODUCTION

DURING the 1960's this country took a giant step toward one of its fondest goals: universal access to higher education. Total enrollment in American institutions of higher learning grew from 3.8 million in 1960 to 8.5 million in 1970.[1] At the same time, the resources devoted to higher education increased tremendously. Amidst the euphoria of rapid growth a number of serious problems have emerged, however. Some educators have begun to question the desirability of a system of mass higher education; others doubt its feasibility. These issues require an examination of the very direction of our system of higher education. But many other problems are more immediate, at least for the individuals and institutions already in the system. Many of these problems are economic in nature. For the schools, there are inflationary rises in costs that cannot be met by traditional sources of revenue. For the students, there are constant increases in tuition and other costs. It is to this last problem that this study is addressed.

It is surprising how little is known about the way a student decides what college to attend, or whether to attend college at all. Economists have long argued that a student should consider higher education an investment in human capital. At its simplest this approach implies that a student pays a certain amount for a particular form of higher education and then reaps the benefits of that education in the form of a higher earnings stream after college. His choice of a college should be relatively simple, a purely economic decision. He should pick the kind of higher education that represents the greatest expected net present value. This is a pure investment decision and should be treated as such.

There are a number of problems with this approach. First, the question of risk is largely ignored. The economic return to a particular investment in higher education is very un-

[1] *New Students and New Places*, A Report and Recommendations by the Carnegie Commission on Higher Education, McGraw-Hill, New York, p. 11.

certain. It depends not only on the student's choice of occupation and his intellectual capabilities but on the structure of future labor markets. In theory, all these factors could be included and the decision treated like any other investment with risk. In practice, this has proved very difficult. Although a model of this sort works with some kind of "average student," it is not very helpful to an individual student trying to make a decision. Even if it were applicable, it is doubtful that more than a few high school seniors (or their families) would be capable of such a sophisticated analysis.

The second problem with the investment model is that it ignores the large consumption benefits derived from higher education. These benefits accrue while the student is in college as well as in later life. They include such things as a fraternity houseparty, a pick-up basketball game in the gym, or a guest lecture by a noted politician. They can also include an increased appreciation of music, a greater interest in politics, the formation of lasting friendships, or a well-formed philosophy of life. Again, while there is no theoretical reason why we could not include all these benefits in an investment model, it is virtually impossible in practice. It would be especially difficult to quantify the differences in these consumption benefits offered by various institutions.

Our purpose here is to examine the behavior of students as they decide where to go to college. In particular, we want to examine the effects of financial considerations on their decisions. To do that, however, we should also take into account all the other factors considered by the student and his family. As the arguments in the preceding paragraphs have made painfully clear, we have very little theoretical basis for identifying those factors, let alone predicting their effects. Instead we have to rely to a great extent on ad hoc reasoning and empirical data.

This study can be divided into two sections. The first, a description of admissions data at a group of select private colleges and universities, is presented in Chapter I. This chapter, an attempt to describe the trends in admissions at these schools, is largely descriptive in nature, with little or

no formal analysis. The second section, Chapters II through V, is an analysis of a national survey of high-aptitude high school seniors. Although these chapters deal mainly with students and institutions with the highest academic credentials, many of our findings have more general applicability.

1

ADMISSIONS TRENDS AT SELECT COLLEGES AND UNIVERSITIES

Introduction

In 1900 over 60 per cent of college students in the United States attended private colleges and universities. By 1960 this figure had fallen to 40 per cent, and in 1970 it was down to 25 per cent.[1] This continuing (and apparently accelerating) trend away from private colleges and universities has long been a source of concern to educators. They fear that many of the private schools will be forced to close their doors for lack of students. At the same time, many public institutions will be unable to keep up with the increase in students wanting a higher education. Not only does this paradox indicate a poor allocation of America's educational resources, but most educators feel that private colleges and universities are essential if we are to continue to provide quality education to students whose interests and abilities vary widely. Without private colleges and universities, the American system of higher education could not provide its students with the range of educational choices it currently offers. But if private schools are to remain an integral part of the system, they must continue to attract students from diverse socioeconomic backgrounds.

The trend toward the public colleges is usually attributed to the large (and ever-increasing) differences in tuition and other fees between private and public institutions. Another reason, however, is the growing importance of junior colleges

[1] *New Students and New Places*, A Report and Recommendations by the Carnegie Commission on Higher Education, McGraw-Hill, New York, 1971, Chart 4, p. 17. Many of the data presented in this chapter were provided by Mrs. Margaret Gordon of the Carnegie Commission on Higher Education and were used in the preparation of *New Students and New Places*. I am very grateful to Mrs. Gordon for her help.

and other two-year institutions, which are almost exclusively publicly controlled. Their growth can be seen in the figures on undergraduate enrollment in Table 1. Between 1965 and 1970 the enrollment at public two-year schools doubled, accounting for almost 22 per cent of total enrollment by 1970. In the same period, enrollments at public and private four-year institutions grew by 42 and 8 per cent, respectively. Thus we can see that the trend away from private colleges and universities toward public four-year institutions, serious as it may have been, has not been as drastic as the total enrollment figures seem to indicate.

In this chapter we will attempt to measure the strength of this trend among the most qualified college applicants. For this purpose, data have been compiled for the last five years from a group of prestigious (and selective) colleges and universities, both public and private.[2] Although many of these schools have done much to enhance the attractiveness of their academic programs, the differences in quality between the select private institutions and their public counterparts have probably not changed inordinately over the last five years. Therefore, it seems reasonable to assume that if there is a trend away from the private schools in this group, it can be attributed mainly to the rising cost differentials.

We collected data from a large number of schools in order to smooth out the effects of circumstances unique to a particular institution, for example, the recent decisions by Yale and Princeton to become coeducational. By compiling averages for a number of schools considered similar in quality and cost, we hoped to be able to see more clearly the general trends in both application and enrollment behavior.

The schools have been divided into three categories for the sake of this examination. The first category, "Private I," includes the most prestigious and selective private colleges and universities. The schools in the second category, "Private II," have roughly the same student charges as the first group but are generally less prestigious academically. They have

[2] A list of these schools is included as Appendix A. I would like to express my appreciation to the admissions officers of these schools, without whose help this work would not have been possible.

TABLE 1

UNDERGRADUATE DEGREE-CREDIT ENROLLMENT IN THE UNITED STATES
(*000 omitted*)

	1965		*1966*		*1967*		*1968*		*1969*		*1970*	
Public institutions:												
Four-year	2,521	(51.3)	2,696	(51.2)	2,918	(51.5)	3,193	(52.2)	3,378	(52.7)	3,579	(52.3)
Two-year	738	(15.0)	840	(16.0)	968	(17.1)	1,169	(19.1)	1,291	(20.1)	1,484	(21.7)
Total	3,259	(66.3)	3,536	(67.2)	3,886	(68.6)	4,362	(71.3)	4,669	(72.8)	5,063	(74.0)
Private institutions:												
Four-year	1,556	(31.6)	1,623	(30.8)	1,665	(29.4)	1,638	(26.7)	1,640	(25.6)	1,679	(24.6)
Two-year	104	(2.1)	105	(2.0)	113	(2.0)	120	(2.0)	102	(1.6)	99	(1.4)
Total	1,660	(33.7)	1,728	(32.8)	1,778	(31.4)	1,758	(28.7)	1,742	(27.2)	1,778	(26.0)
Total undergraduate enrollment	4,919		5,264		5,664		6,120		6,411		6,841	

NOTE: Figures in parentheses are percentages of total enrollment.
SOURCE: Mrs. Margaret Gordon of the Carnegie Commission on Higher Education.

been included because they compete more directly with the public institutions than do the very top private schools, which compete mainly among themselves. A change in the pattern of choice between public and private schools should therefore be felt earlier and more strongly by the Private II schools. A significant trend away from these schools would be a cause of concern, both because of its implications for the future of these institutions and because of the danger it signals for the Private I schools. From the third category, a group of the best state universities, we collected admissions data on both in-state ("State — residents") and out-of-state ("State — nonresidents") applicants. From all these schools we collected data on applications and enrollments for the years 1967 through 1971 (i.e., the freshman classes for the academic years 1967–68 through 1971–72).

Applications

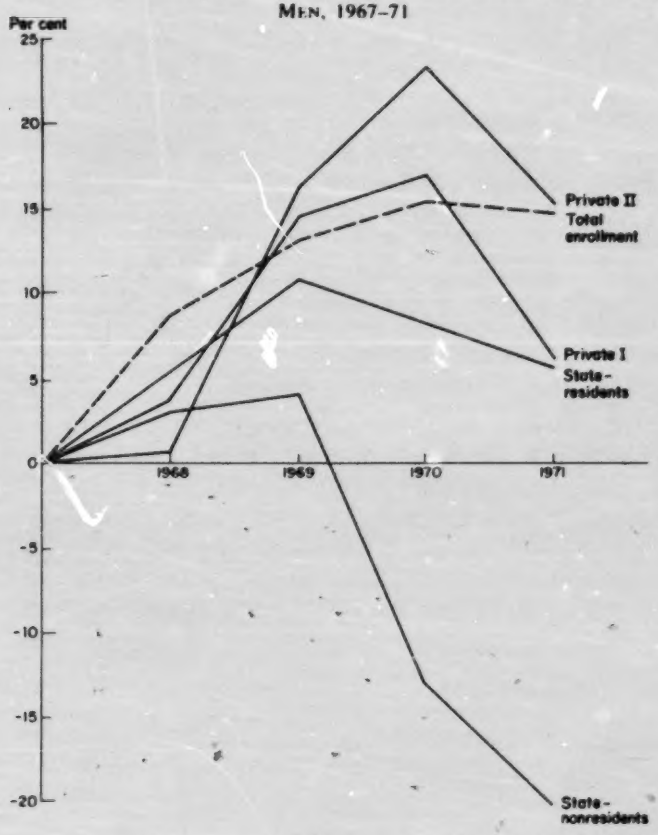
Because of the diversity in school size, we looked at the percentage changes from the 1967 level in the number of applications for admission for each entering class, rather than the absolute numbers of applications. This percentage is not the same as the year-to-year rate of growth of applications. As an illustration of this, consider the following hypothetical example:

	1967	*1968*	*1969*	*1970*	*1971*
Applications	1,000	1,100	1,200	1,200	1,100
Percentage change from 1967 base		+10.0	+20.0	+20.0	+10.0
Annual rate of growth		+10.0	+9.1	0.0	−8.3

Since we have taken the averages of a fairly large number of schools, our implicit assumption that 1967 was in some sense a normal year does not seem unreasonable. By using the average of these percentages we are counting all the schools equally, rather than weighting them by the number of appli-

FIGURE 1A

AVERAGE PERCENTAGE CHANGES IN APPLICATIONS FROM 1967 LEVELS, MEN, 1967–71

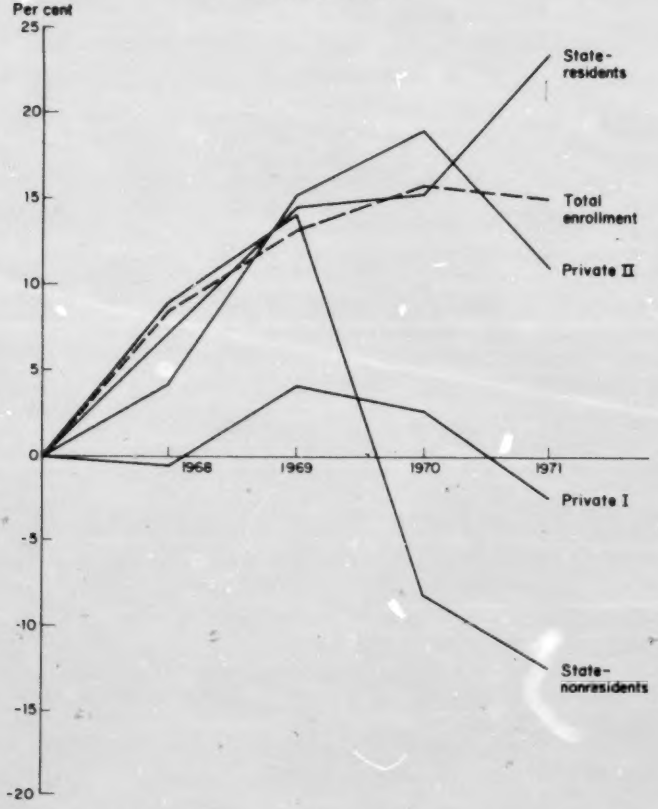


cations. The assumption here is that the schools have all been influenced by the same basic trends in admission, subject only to their differences in scale.

The average changes in applications are reported in Figures 1A and B for men and women, respectively. In addition, the dotted lines show the changes in total enrollment of first-time freshmen (men and women) at all four-year institutions in

FIGURE 1B

AVERAGE PERCENTAGE CHANGES IN APPLICATIONS FROM 1967 LEVELS, WOMEN, 1967–71



the United States, also computed using 1967 as a base.[3] These data were included in an attempt to compare the trends in applications to select colleges and universities with the rate

[3] The enrollment figures were also provided by Mrs. Margaret Gordon of the Carnegie Commission. As it was not possible to break them down by sex, both Figures 1A and 1B show the changes in total enrollment.

of growth of the total applicant pool. Applications and enrollments are quite different, however, and neither concept provides a precise measure of the size of the applicant pool. The number of enrollments may underestimate the size of this pool if a significant number of potential college students decide not to enroll. There is some evidence that many qualified high school graduates are doing just that.[4] The number of applications is not a good estimate of the size of the applicant pool either. Since most students apply to more than one college, the number of applications to any group of schools will be greater than the number of students in their applicant pool. If students are applying to more schools now than they did five years ago, the rate of growth of the applicant pool has not been as great as the increases in applications would suggest. This question of multiple applications is an important one and will be discussed in somewhat greater detail in the next section. In any event, we cannot expect to draw substantive conclusions from a comparison of applications trends with general enrollment data.

In Figure 1A only the out-of-state applicants to public schools seem to deviate from the general pattern. One obvious reason for the downward trend in nonresident applications to the top state universities would be that admission to these schools from out of state has become much more difficult and many students are not bothering to apply. It is worth noting, however, that the number of public universities for which data were available was fairly small (six for nonresidents, seven for residents). Thus these results should be viewed with considerable caution.

The rest of the schools described in Figure 1A follow a surprisingly consistent pattern. Applications increase in 1968 and 1969, level off somewhat in 1970, and fall in 1971. Enrollment follows the same general pattern. The number of applications actually drops at the state universities in 1970, but the drop in 1971 is smaller for them than for the private schools. In general, this evidence seems to support the hypothesis that there has been no significant trend toward apply-

[4] Carnegie Commission, *op. cit.*, Chap. 8.

ing to the top state universities rather than the select private colleges and universities.

The pattern for women applicants, shown in Figure 1B, is less clear-cut, though very similar to that of the men. The most obvious difference is the relative absence of growth at the most prestigious private schools, where the number of applications has barely changed over the last five years. One reason for this phenomenon might be the large number of women's colleges in this group. Many of them have felt the pressure of the increasing number of women wanting to go to coeducational rather than women's schools. In addition, they have been hurt somewhat by the decisions of schools like Yale, Princeton, and Williams to become coeducational. Another difference between Figures 1A and B is the rise in 1971 of in-state applications at state universities by women. In part, this may reflect the greater social activism of women and their desire to share more fully in the benefits of our society. It may also be that women, in their choice of a college, are more affected than men by purely economic factors. If so, they would be more likely to react to the rising cost differentials between the private schools and their own state universities.

The year-to-year fluctuations in both figures are not easy to explain. To some extent, they reflect the state of the economy. In 1968 and 1969 the economy was still booming, although the threat of runaway inflation caused a great deal of concern. By the end of 1969 (when decisions about applying to college for 1970 were being made) the economy had cooled off considerably. By the winter of 1970–71 the nation was experiencing a real recession. It is not surprising that this period of high unemployment *and* rapidly rising prices experienced a marked decline in college applications.

A second possible explanation for this general pattern in the number of applications comes from the changing rates of population growth. The effect of the postwar baby boom on college enrollments peaked in the mid-sixties. Since then, the rate of growth of the college-age population has fallen considerably (see Table 2). Most of the growth in college

enrollments over the last five years has been due to increases in the percentage of that population going to college.[5] In all likelihood, this kind of growth is of only limited importance to the colleges and universities in this sample. Most students interested in these schools are in the upper ranges of academic ability, where enrollment rates were already high by 1967. Since the rate of growth of the pool of possible applicants to these schools has fallen, the rate of growth of applications could be expected to slacken.

TABLE 2

NUMBER OF PEOPLE IN THE 18 TO 21 AGE GROUP AND NUMBER OF 18-YEAR-OLDS, 1967–71
(*000 omitted*)

	1967	*1968*	*1969*	*1970*	*1971*
Aged 18–21:					
Number	13,676	14,378	14,218	14,371	14,680
% change from 1967		+5.1	+4.0	+5.1	+7.3
Aged 18:					
Number	3,543	3,514	3,614	3,703	3,847
% change from 1967		−0.8	+2.0	+4.5	+8.6

Yield

Figures 2A and B show the trends in the yield on admissions, that is, the percentage of those admitted to a particular school who actually enroll. The two figures give the changes in the average yields from their 1967 levels (shown in Table 3). The absolute amount of this change is shown, rather than a percentage change like that used in Figures 1A and B. Since the yields for individual schools are already in percentage terms, the average yield weights each school equally and is also in percentage terms. The average change from the 1967 yield was used in order to highlight the differences in trends between types of institutions rather than just the differences in overall yield. However, it would be a simple matter to

[5] *Ibid.*, Chap. 2.

FIGURE 2A

AVERAGE CHANGES IN YIELDS FROM 1967 LEVELS, MEN, 1967–71

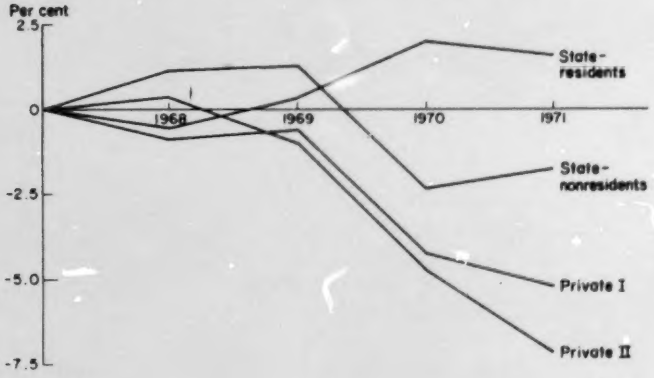


FIGURE 2B

AVERAGE CHANGES IN YIELDS FROM 1967 LEVELS, WOMEN, 1967–71

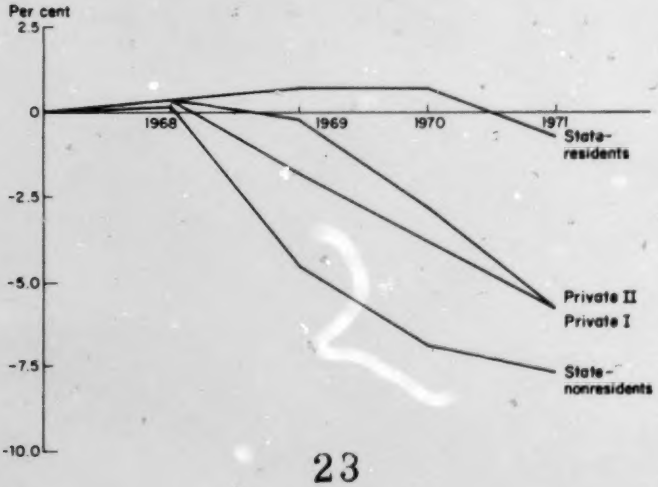


TABLE 3

AVERAGE YIELDS IN 1967 FOR THE SCHOOLS IN OUR SAMPLE
(*in per cent*)

	Men	*Women*
Private I	60.2	60.9
Private II	46.9	47.7
State — residents	56.8	60.6
State — nonresidents	45.7	49.4

compute the average yield for any category using only Figure 2A or B and the appropriate 1967 yield.

Figures 2A and B show that the trends in yield have in general been downward. A possible explanation is that more students are deciding either to take time off before going on to college or not to go to college at all. Alternatively, students may be applying to and being admitted by more schools. This would mean that there is increased competition for the same applicants. In our earlier discussion of Figures 1A and B, however, we implicitly assumed that increases in the number of applications reflected actual additions to the total applicant pool. It is very difficult to measure the extent to which students are applying to more (or fewer) schools. Many people are convinced that there is a trend toward more applications per student, but the College Entrance Examination Board and the Educational Testing Service report that the average number of schools to which an applicant has his College Board scores sent has been 2.3 for each of the last five years.[6] Of course, this says nothing about the behavior of various subgroups of the total applicant pool. It is still possible that the practice of multiple applications has become more common among students applying to the most prestigious schools. Because the number of students taking the College Board exams is so large (around two million each year), evidence of such a phenomenon could easily be obscured by the averaging process.

[6] Although the schools to which scores are sent and those to which the student applies are not always identical, this value does provide a reasonable proxy for the number of applications filed.

Admissions Trends at Select Colleges

The downward trend in yields shown in Figures 2A and B is particularly noticeable for the private colleges. There are two possible interpretations. First, private schools in general may be losing students to the state universities and other public institutions. The implications of such a trend, if it exists, for the future of private higher education are fairly obvious. Second, private schools may be competing more and more among themselves for the same group of students. Although such competition is much less serious in terms of what it implies about the future of private higher education, it clearly poses a threat to many individual institutions. Unless the pool of qualified applicants grows more rapidly than it has in the last five years, an attempt by any one of these select private colleges to improve the quality of its student body or to expand in size must be accomplished largely at the expense of the other schools in this category.

Public vs. Private

Figures 3A and B show the average percentage of students declining an offer of admission to a private college who indicated that they were enrolling at a public institution. It should be pointed out that the number of schools able to provide this information was quite small (5 for "Private II," 6 and 7 for "Private I," women and men respectively), and therefore we should be careful not to attach too much significance to these results. However, these figures do provide some evidence that public institutions have not risen much in relative popularity. The results are remarkably consistent. For both men and women there has been a slight increase in the percentage of declines who go to a public school. Over the five-year period, these increases were between 1 and 2 percentage points. The dip that all four categories experienced in 1969 is very puzzling. While it is true that in 1969 the economy was at the height of its boom period, the economy was also booming in 1968 and the pattern for that year looks quite different. In any event, the dip in 1969 seems to have been the result of some temporary phenomenon. In 1970 the percentage of declines going to public schools rose above its 1968 level and then renewed its slight upward path.

FIGURE 3A

PERCENTAGE OF DECLINES WHO ENTER PUBLIC INSTITUTIONS, MEN, 1967–71

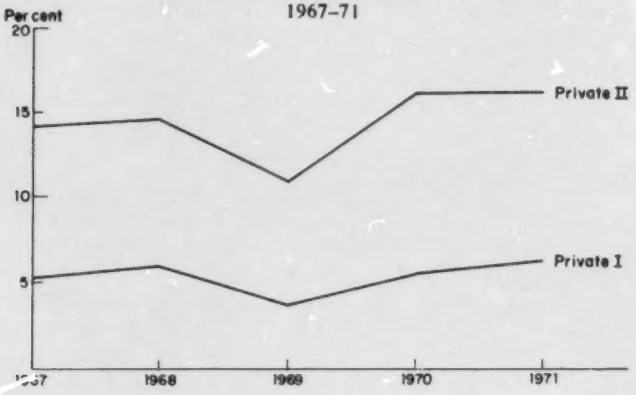
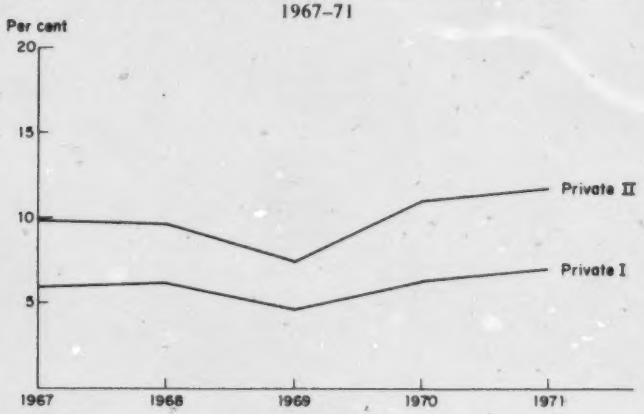


FIGURE 3B

PERCENTAGE OF DECLINES WHO ENTER PUBLIC INSTITUTIONS, WOMEN, 1967–71



The general conclusion to be drawn from these figures is that the public institutions have grown only slightly in popularity among students admitted to good private schools. However, since yields have been falling at private colleges and universities, more students are declining admission now than in 1967. Thus the relatively constant percentages shown in

Figures 3A and B mean that in absolute numbers the private colleges are losing more students to the public institutions. In light of our earlier discussion of falling yields, it is clear that the select private colleges and universities are facing increased competition, both from one another and from other public and private institutions. It also appears that the relative competitiveness of the public schools has risen only slightly, if at all.

In conclusion, it appears that the problems faced by select private colleges and universities in attracting qualified students have been somewhat exaggerated. Over the last five years, the number of applications followed the same general pattern at private and public institutions. The select private colleges have experienced a drop in yield, but the proportion of students declining admission who go to public schools has remained quite stable. Although individual private institutions are facing increased competition, it does not appear that the private colleges as a group have declined in popularity. The most serious problem seems to be a virtual halt in growth of the pool of qualified applicants.[7]

There is at least one problem with this method on analysis, however. Throughout this chapter we have assumed that the private colleges have been put at a competitive disadvantage by their rising costs. But the question of relative competitiveness is more complicated than that. From Table 4, on page 18, we can see that the cost of attending a state university has also risen over the last five years. Although the absolute difference in costs between public and private schools has grown, the rates of increase have been roughly the same. Table 4 also shows that these costs have not increased much faster than the general price level, as measured by the GNP deflator. As a result, it is not at all clear that there has been a substantial change in the relative cost of any group of colleges, or, for that matter, of higher education as a whole. Thus the results described in this chapter should be viewed with even more than the normal degree of skepticism.

[7] For a more detailed discussion of this problem, see Humphrey Doermann, *Crosscurrents in College Admission*, Teachers College Press, New York, 1968.

TABLE 4

COSTS AT SELECT COLLEGES AND UNIVERSITIES, 1967–71[a]

	1967	*1968*	*1969*	*1970*	*1971*
Men:					
Private I:					
Cost	$3,513	$3,727	$3,903	$4,202	$4,580
% change from 1967		+6.1	+11.1	+19.6	+30.4
Private II:					
Cost	3,462	3,576	3,846	4,037	4,323
% change from 1967		+3.3	+11.1	+16.6	+24.9
State — residents:					
Cost	1,789	1,840	1,923	2,063	2,253
% change from 1967		+2.9	+7.5	+15.3	+25.9
State — nonresidents:					
Cost	2,319	2,387	2,476	2,779	3,026
% change from 1967		+2.9	+6.8	+19.8	+30.5
Women:					
Private:					
Cost	$3,542	$3,619	$3,837	$4,096	$4,465
% change from 1967		+2.2	+8.3	+15.6	+26.1
Private II:					
Cost	3,472	3,588	3,819	4,022	4,293
% change from 1967		+3.3	+10.0	+15.8	+23.6
State — residents:					
Cost	1,780	1,837	1,921	2,045	2,242
% change from 1967		+3.2	+7.9	+14.9	+26.0
State — nonresidents:					
Cost	2,307	2,379	2,489	2,776	3,025
% change from 1967		+3.1	+7.9	+20.3	+31.1
GNP price deflator:[b]					
Index	117.6	122.3	128.2	135.2	141.6
% change from 1967		+4.0	+9.0	+15.0	+20.4

[a]The costs, estimated by the College Scholarship Service, include tuition, room, board, fees, plus an estimate of travel and other personal expenses.

[b]The GNP deflator is the rate used to convert the current dollar amount of all goods and services produced in the United States into 1958 dollars (from *Survey of Current Business*).

II

THE APPLICATION DECISION: A GENERAL MODEL

A Statement of the Problem

The best way to determine the effects of financial variables on students' college choices is to examine the decision-making process of individual students. We can learn a great deal from the kind of aggregated data described in Chapter I, but there is no substitute for individual data.

Analytically, a student's choice of a college should be treated as two separate (but not independent) decisions. The first decision is where to apply. The second is which college to attend among all those to which he was admitted. A great deal of research has been done on the college-selection process, but most of it has failed to distinguish between the application and enrollment decisions.[1] The remainder of this paper will concentrate almost exclusively on the application decision, for two reasons. First, the enrollment decision presents a number of complex analytical problems, the most serious of which is that a student's decision to enroll at a particular school depends heavily on his alternatives, the other schools to which he has been admitted. It would be very difficult to account for the presence of these alternatives in an empirical model. The application decision is much simpler. The decision whether or not to apply to one school does not depend directly on the other schools the student is consider-

[1] One of the most ambitious efforts to date in this area has been the work of Steven A. Hoenack, "Private Demand for Higher Education in California," unpublished doctoral dissertation, University of California at Berkeley, 1967. A second example of such work is Meir G. Kohn, Charles F. Manski, and David S. Mundel, "A Study of College Choice," research in progress at Harvard University and the Massachusetts Institute of Technology.

ing.[2] Furthermore, this decision is made strictly by the student and his family. The colleges play an essentially passive role, since any pre-selection that exists in the application process is a result of the student's own perception of the situation.

There is a second, more satisfying, reason for concentrating on the application decision. We have found that students in the higher ranges of academic ability generally select the type of school they wish to attend and then apply almost exclusively to schools in that category. In particular, for most students in our sample (which will be described in detail shortly) the schools to which they applied fell within a fairly narrow range of costs. One measure of this range is the difference in cost between the most expensive and the least expensive schools applied to. The mean of this difference for students in our sample was less than $600. A second measure is the standard deviation of the costs. The average value of this standard deviation was about $250.[3] If we assume that each student's applications are distributed normally around some mean cost, then for the average student in our sample 95 per cent of his college applications are to schools falling within a cost range of $1,000. Thus it appears that the most interesting decisions are made during the application process.

A National Sample of Students

Our basic source of data was a national survey of the parents of students entering college for the first time in the fall of 1971.[4] These students were selected at random from

[2] This statement is not completely true. In some sense, a student selects a portfolio of applications, balancing his desire to attend various schools with his risk of being denied admission at those schools. In an attempt to explain these choices, Neal Soss of Princeton University is working on a portfolio model of applications.

[3] For each student, the average costs were computed for the schools to which he was applying. An estimate of the standard deviation of the costs around this mean was then computed. For any student who applied to only one school (or to several schools with exactly the same costs), this estimate would be zero. Finally, the average of these standard deviations was computed for the entire sample.

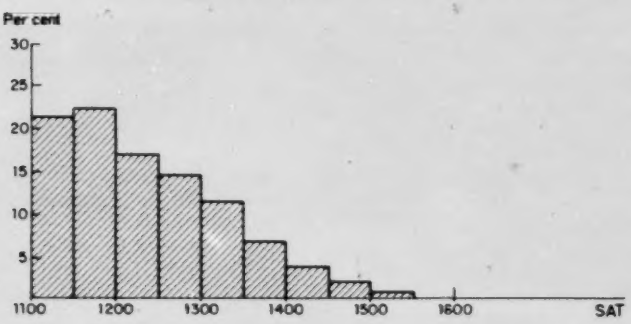
[4] The questionnaire is included as Appendix C.

the list of high school seniors who took the College Board examinations in the 1970–71 academic year and achieved a total score of at least 1100 on the SAT's.[5] A high cutoff level of SAT scores was used to ensure that all the students in the sample had a wide range of colleges from which to choose. Also these are generally the students whom the select private colleges are most interested in attracting.

In this survey we asked the student's parents a series of questions about their socioeconomic background, where their child had applied, where he had been admitted, where he had been offered financial aid, and where he was enrolling. After discarding cases with incomplete or unusable data, we emerged with a sample of 1,407 students. Of these, 60 per cent were men and 40 per cent women. Almost 98 per cent were white. Over 80 per cent had gone to public high schools and about half are now attending public colleges or universities. They came from unusually high-income families — over half had family incomes greater than $15,000 in 1970. Finally, most of them scored nearer the bottom of the possible SAT range (1100 to 1600). Only ten students in the entire sample scored above 1500 on their SAT's. Figures 4 and 5 show the SAT and family-income characteristics of this sample in greater detail.

FIGURE 4

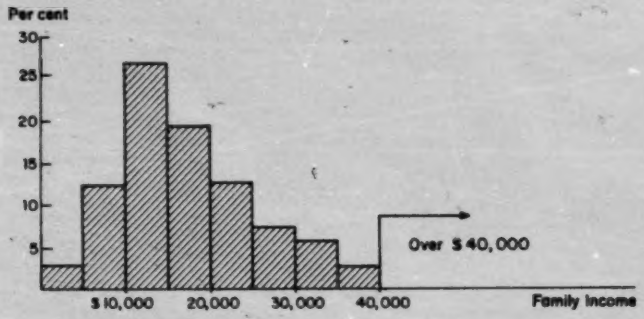
PERCENTAGE DISTRIBUTION OF SAT SCORES IN SURVEY SAMPLE



[5] The sampling procedure is described in Appendix B.

FIGURE 5

PERCENTAGE DISTRIBUTION OF FAMILY INCOME IN SURVEY SAMPLE



The final college choices of these students, in terms of cost, quality, and aid, are shown in Table 5. They cover the whole

TABLE 5

FINAL COLLEGE CHOICES OF STUDENTS IN SAMPLE

Cost of College[a]	*Per Cent of Students*	*Quality of College*[b]	*Per Cent of Students*
Under $1,000	0.1	Under 1000	15.8
$1,000–1,999	11.3	1000–1099	31.2
$2,000–2,999	36.5	1100–1199	22.3
$3,000–3,999	25.6	1200–1299	17.9
$4,000 and over	23.3	1300–1399	7.8
None	3.2	1400 and over	1.8
		None	3.2

Financial Aid Recipients	*Per Cent of Students*[c]
Scholarship	37.9
Loan	19.2
Job	15.2
None	49.0

[a]Cost includes tuition, room, board, fees, and personal expenses, as determined by the College Scholarship Service.

[b]Median combined SAT score of incoming freshmen.

[c]This column does not add to 100 per cent because many students received more than one form of aid.

gamut of alternatives, from the very selective and very expensive private schools to no school at all. It is clear, however, that the students in this sample are more likely to attend a private college than the average high school senior. They are more likely to attend a high-cost, selective school (most of which are private). Finally, they are more likely to receive financial aid than the average student. These results are not surprising, since the sample consists exclusively of students with high academic ability.

It is often argued that there is a strong correlation between family income and a student's SAT score.[6] However, the distribution of income within SAT groupings in this sample shows that the degree of correlation between the two variables is only 0.124 (see Table 6). This does not mean that income and SAT performance are not correlated but only that, within this fairly narrow range of SAT scores, the correlation is not significant. Since less than one-third of the students who take

TABLE 6

DISTRIBUTION OF SAT SCORES BY INCOME

	Family Income			
SAT Score	*Under $10,000*	*$10,000–19,999*	*$20,000–29,999*	*$30,000 and Over*
1100–1149	29.9	21.0	18.1	18.8
1150–1199	26.1	23.7	19.9	18.7
1200–1249	11.8	18.0	20.6	14.2
1250–1299	14.7	13.4	14.1	17.9
1300–1349	8.5	12.3	11.9	11.3
1350–1399	4.7	7.3	6.1	7.9
1400–1449	1.9	2.4	4.3	8.7
1450–1499	2.4	1.4	2.9	2.1
1500–1549	0	0.5	2.1	0.4
1550–1600	0	0	0	0
Total	100.0	100.0	100.0	100.0

[6] See Humphrey Doermann, *Crosscurrents in College Admissions*, Teachers College Press, New York, 1968.

the SAT's score in this range,[7] this correlation says almost nothing about the total population of high school graduates. In fact, the high-SAT students in our sample come from families with much higher income than do most of their contemporaries. The figures in Table 7, showing the differences in income distribution between this sample and the American Council on Education national survey of college freshmen, imply that over the whole range of SAT scores there is a correlation between income and ability.[8]

TABLE 7

INCOME DISTRIBUTION OF SAMPLE AND ACE NATIONAL NORM
(*in per cent*)

Family Income	*Sample of 1100+ SAT*	*ACE National Norm*[a]
Under $10,000	15.4	34.0
$10,000–14,999	26.9	33.0
$15,000–19,999	19.6	14.6
$20,000–24,999	12.9	7.9
$25,000–29,999	7.5	3.7
$30,000 and over	17.7	6.8
Total	100.0	100.0

[a]Average of all college freshmen, fall of 1971.

In addition to the factual questions about college choices and socioeconomic background, parents were asked why their children had made those choices. From a list of possible factors they were asked how important each had been in their child's selection of a college. The results, presented in Table 8, show clearly that academic considerations far outweigh financial ones.

[7] Percentiles are not computed for total SAT scores, but a 550 on the math SAT would put a student somewhere around the 78th percentile. A comparable verbal score would be in the 69th percentile. Although there are 501 possible combinations of math and verbal scores adding to 1100 (ranging from 800-300 to 300-800), it is probably safe to say that 25 to 30 per cent of the students who take the SAT's score in 1100+ range.

[8] The two surveys are not strictly comparable. The ACE survey was administered by the colleges and universities during registration, and the students answered the questions. Our questionnaire, on the other hand, was answered by the parents.

TABLE 8

RESPONSES TO QUESTION 10 OF THE SURVEY QUESTIONNAIRE

QUESTION 10: Please circle the number which shows how important *each* of these factors was in your child's selection of a college.

(N = *1,574; in per cent*)

	Very Important	*Fairly Important*	*Not Important*	*No Response*
A. Total Responses				
Financial considerations:				
The cost of tuition, room, and board	34	31	30	5
An offer of financial assistance	23	8	54	15
Academic considerations:				
The college's over-all reputation	56	35	5	4
Your child's desired field of study	55	27	11	7
The advice of others:				
The advice of school counselors and other adults	17	37	35	11
The advice of other young people	8	25	50	17
Location and size:				
The distance of the college from your home	20	35	41	4
The type of setting or section of the country	21	33	40	6
The size of the college	25	32	37	6
B. Distribution of Responses by Sex				
Financial considerations:				
The cost of tuition, room, and board:				
Male	31	30	32	7
Female	37	32	26	5
An offer of financial assistance:				
Male	24	7	54	15
Female	21	10	54	15
Academic considerations:				
The college's over-all reputation:				
Male	57	34	4	5
Female	52	37	6	5
Your child's desired field of study:				
Male	56	26	10	8
Female	52	29	13	6

TABLE 8 (*continued*)

	Very Important	*Fairly Important*	*Not Important*	*No Response*
The advice of others:				
The advice of school counselors and other adults:				
Male	17	40	32	11
Female	16	34	39	11
The advice of other young people:				
Male	8	23	51	18
Female	8	29	49	14
Location and size:				
The distance of the college from your home:				
Male	18	34	43	5
Female	21	37	38	4
The type of setting or section of the country:				
Male	20	31	42	7
Female	23	35	36	6
The size of the college:				
Male	23	32	39	6
Female	27	32	35	6
C. Distribution of Responses by Family Income				
Financial considerations:				
The cost of tuition, room, and board:				
Under $7,500	52	24	12	12
$7,500–15,000	49	30	15	6
$15,000–30,000	28	37	30	5
Over $30,000	11	21	62	6
An offer of financial assistance:				
Under $7,500	51	14	18	17
$7,500–15,000	38	12	33	17
$15,000–30,000	14	9	62	15
Over $30,000	5	2	84	9
Academic considerations:				
The college's over-all reputation:				
Under $7,500	57	28	5	10
$7,500–15,000	55	35	5	5
$15,000–30,000	53	38	5	4
Over $30,000	54	38	6	2

TABLE 8 (*continued*)

	Very Important	*Fairly Important*	*Not Important*	*No Response*
Your child's desired field of study:				
Under $7,500	51	26	12	11
$7,500–15,000	57	28	8	7
$15,000–30,000	53	27	13	7
Over $30,000	44	34	15	7
The advice of others:				
The advice of school counselors and other adults:				
Under $7,500	16	41	28	15
$7,500–15,000	19	37	32	12
$15,000–$30,000	13	38	38	11
Over $30,000	15	39	36	10
The advice of other young people:				
Under $7,500	12	25	42	21
$7,500–15,000	9	25	47	19
$15,000–30,000	6	24	54	16
Over $30,000	11	24	49	16
Location and size:				
The distance of the college from your home:				
Under $7,500	28	34	31	7
$7,500–15,000	24	35	36	5
$15,000–30,000	15	37	44	4
Over $30,000	15	29	51	5
The type of setting or section of the country:				
Under $7,500	16	32	38	14
$7,500–15,000	18	30	43	9
$15,000–30,000	21	34	41	4
Over $30,000	26	39	30	5
The size of the college:				
Under $7,500	18	32	36	14
$7,500–15,000	24	27	42	7
$15,000–30,000	24	32	39	6
Over $30,000	31	39	25	5

A General Model of Applications

Building a model that, in its most general form, would explain how a student picks the colleges to which he wants

to apply is not the same as predicting whether or not he will apply to a particular school. Applying to a college is not a costless procedure. In addition to the application fee, an applicant has to invest a considerable amount of time and energy filling out forms and obtaining recommendations. As a result, most applicants apply to a limited number of schools. In order to predict exactly which schools a student will apply to, we would have to know much more about how students acquire information about colleges or else assume they have perfect information. In addition, we would have to explain how such considerations as geographical location enter into these decisions. Since there are more than 2,600 colleges and universities in this country, the complexity of this problem should be obvious.

We have already seen that students tend to apply mainly to schools that are very similar, particularly in terms of cost and quality. Thus we will concentrate our investigation on the process by which they choose that group of schools. We have divided the colleges and universities in the United States into sixteen categories, based on cost and quality. The cost variable used was the College Scholarship Service estimate of student budgets. The quality variable was the median combined SAT (or its equivalent) for the entering freshman class.[9] These sixteen fairly broad categories are shown in Table 9.[10]

[9] The cost figures were obtained from William J. Cavanaugh, *CSS Student Expense Budgets of Colleges and Universities for the 1971–72 Academic Year*, College Scholarship Service, Princeton, N.J., March 1971. They comprise tuition and fees (including the additional charge to out-of-state students, if appropriate), room, board, and miscellaneous expenses. The median SAT scores were obtained from the American Council on Education's *Institutional Research File* and cover the academic year 1967–68. These somewhat dated data were the best available. However, it is highly unlikely that this variable has changed significantly for many schools in the last four years.

[10] An attempt to break these categories down further on the basis of size (number of students enrolled), location (urban or rural, section of the country), control (public, private independent, parochial), and sex (all male, all female, coeducational) left most categories without any schools in them. Thus it was decided to use the broad categories shown here. Some experiments with size and control categories proved unsuccessful.

TABLE 9

COLLEGE CATEGORIES[a]

COST \ QUALITY				
	10 Cost: $1,000–1,999 SAT: 1000–1099	**11** Cost: $1,000–1,999 SAT: 1100–1199	**12** Cost: $1,000–1,999 SAT: 1200–1299	**13** Cost: $1,000–1,999 SAT: 1300+
	20 Cost: $2,000–2,999 SAT: 1000–1099	**21** Cost: $2,000–2,999 SAT: 1100–1199	**22** Cost: $2,000–2,999 SAT: 1200–1299	**23** Cost: $2,000–2,999 SAT: 1300+
	30 Cost: $3,000–3,999 SAT: 1000–1099	**31** Cost: $3,000–3,999 SAT: 1100–1199	**32** Cost: $3,000–3,999 SAT: 1200–1299	**33** Cost: $3,000–3,999 SAT: 1300+
	40 Cost: $4,000+ SAT: 1000–1099	**41** Cost: $4,000+ SAT: 1100–1199	**42** Cost: $4,000+ SAT: 1200–1299	**43** Cost: $4,000+ SAT: 1300+

[a]The numbers in boldface are the category labels. Colleges costing less than $1,000 a year or having a median SAT score less than 1000 were not included.

The Application Decision

In theory, a student decides whether or not to apply to a particular school on the basis of his own characteristics and what he perceives to be the characteristics of the school. In our model, the student characteristics are family income and academic ability and the school characteristics are cost and quality. The dependent variable in our regressions is the proportion of students in a given income-ability category who apply to at least one school in the cost-quality category. The independent variables include the income and SAT values for that category of student and the average cost and quality of the schools in that category.[11]

Results

The model we finally used took the form:

$$\text{PCAPP} = a_0 + a_1\text{Y} + a_2\,\text{SAT} + a_3\,\text{QUAL} + a_4(\text{COST/Y}) + a_5\,(\text{SAT} - \text{QUAL})^2 + a_6\,\text{NS} + u$$

where PCAPP = proportion of students who applied
Y = annual family income in thousands of dollars
SAT = student's combined SAT score in hundreds of points
QUAL = college's median combined SAT score in hundreds of points

[11] For example, suppose there were 100 students with annual family incomes between $20,000 and $24,999 and SAT scores between 1200 and 1249. Suppose further that 25 of these students had applied to at least one school that had costs in the $2,000–2,999 range and a median SAT between 1100 and 1199. This would constitute one observation, with variables assuming the values:

1. Proportion applying — .25
2. Income — $22,500
3. Ability — 1225
4. Cost — $2,500
5. Quality — 1150

The values of these variables have been computed for each combination of student and school categories. The result, after deleting combinations with only a few students or a few schools, was 650 observations of each variable. These observations were then used as the data in a multiple regression.

COST = cost of attending that college in thousands of dollars
NS = number of schools in the given cost-quality category
u = random error term

The results of this regression are reported in Table 10. In our initial attempts to estimate this equation, COST was included as a separate variable. However, its coefficient was never statistically significant and it was dropped from the final regression. The last three variables in Table 10 were included on an *ad hoc* basis. Their exact forms are somewhat arbitrary; we experimented with several different forms and picked the ones that gave the best results. The COST/Y variable is simply cost as a proportion of income. This was included to measure the interaction between cost and income in the regression. All other things being equal, the proportion of applications should fall as this variable rises. The $(SAT - QUAL)^2$ variable was also included to measure the degree of interaction, this time between the ability of the student and the quality of the school. We would expect students to be less likely to apply to a school the farther they are from some measure of average student ability. Other variables such as the absolute value of

TABLE 10

REGRESSION RESULTS FOR A GENERAL APPLICATION MODEL

Dependent Variable: PCAPP

Variable	*Coefficient*	*t-Statistic*
Constant	−0.9984	10.20*
Y	0.0009	2.16*
SAT	0.0380	5.27*
QUAL	0.0555	8.55*
COST/Y	−0.0672	2.69*
$(SAT - QUAL)^2$	−0.0159	7.87*
NS	0.0018	13.89*

$R^2 = 0.337$

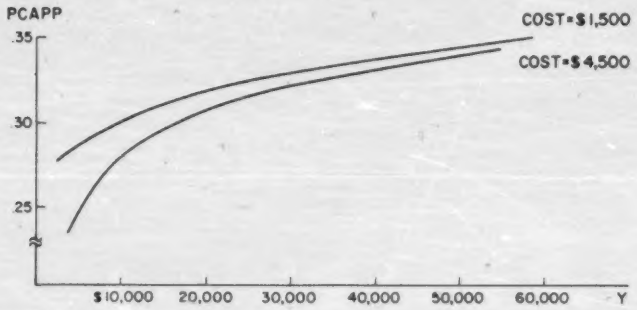
*Significant at the 95 per cent level.

this difference measure the same thing, but this quadratic form gave the best results. Finally, NS was included because of the large differences in the number of schools in each category. Some categories had a high proportion of applications simply because they had a large number of schools. Although the number of schools should not make any difference in theory, we found that our results were significantly improved when this variable was included.

The coefficients reported in Table 10 all seem reasonable. The partial derivative of PCAPP with respect to Y is $0.0009 + 0.0672(\text{COST}/Y^2)$. This means that the proportion of applications increases as income rises, as one would expect; that the proportion increases faster for higher-cost schools; and that the rate of increase apparently falls as income rises (i.e., the second derivative is negative). Figure 6 illustrates all this quite clearly. However, the most interesting thing to note in Figure 6 is that, as income rises from $5,000 to $50,000, the proportion of applications increases less than 10 per-

FIGURE 6

PROPORTION OF APPLICATIONS AS A FUNCTION OF FAMILY INCOME, BY COST OF SCHOOL



Note: Cost and income are given in terms of dollars, not thousands of dollars. We assume an SAT score of 1200, a school median SAT of 1200, with NS of 100. Different assumptions would merely shift the curves up or down.

centage points, even for schools costing $4,500. For a student with an income of $10,000 and SAT scores of 1200 applying to a school costing $5,000 and having a median SAT of 1200, the income elasticity[12] of this percentage is only 0.15. This implies that family income plays a very small role in the college-application decision. Contrary to the belief of many educators, students from low-income families have not been systematically excluded from applying to the more expensive colleges.

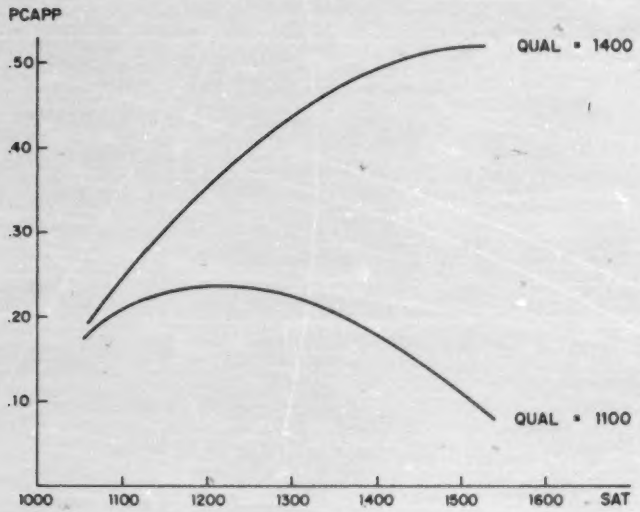
Figure 7 illustrates the effects of a student's academic ability on his application decisions. It is obvious that there is an enormous amount of interaction between his academic ability and the quality of school being considered. The partial derivative of PCAPP with respect to SAT is $0.0380 - 0.0318(\text{SAT} - \text{QUAL})$. It is positive as long as $\text{SAT} - \text{QUAL} < 1.20$. In other words, once a student's SAT score exceeds the school's median by 120 points or more, then the probability that he will apply decreases as his SAT score goes up. This is not as unreasonable as it might seem. At some point (apparently at $\text{SAT} - \text{QUAL} = 1.20$), the school is not good enough for him, and so he begins to concentrate his attention on better schools. This is shown clearly in Figure 7. For schools with a median SAT of 1400, the proportion of students applying rises with SAT throughout the relevant range.[13] Meanwhile, the proportion applying to schools with a median SAT of 1100 peaks out at 1220. These results support the hypothesis that a student makes a conscious effort to find a school where the average ability matches his own.

[12] Elasticity is one way to measure the effects of one of the independent variables on the dependent variable. If $y = f(x_1, x_2)$, the elasticity of y with respect to x_1 is defined as $(\partial y/\partial x_1) \times (x_1/y)$. This is the same as $(\partial y/y)/(\partial x_1/x_1)$, which is the percentage change in y resulting from a 1 per cent change in x_1. In this case, the income elasticity of PCAPP is $(\partial \text{PCAPP}/\partial \text{Y}) \times (\text{Y}/\text{PCAPP})$. For price elasticities, a minus sign is usually included to make the elasticity positive. This is just a convention.

[13] The curve actually turns down when the SAT score hits 1520, but there were very few students with scores above this level and very few schools with a median SAT of 1400 or more. Thus an extrapolation of this kind has very little meaning.

FIGURE 7

PROPORTION OF APPLICATIONS AS A FUNCTION OF SAT SCORE, BY SCHOOL MEDIAN SAT



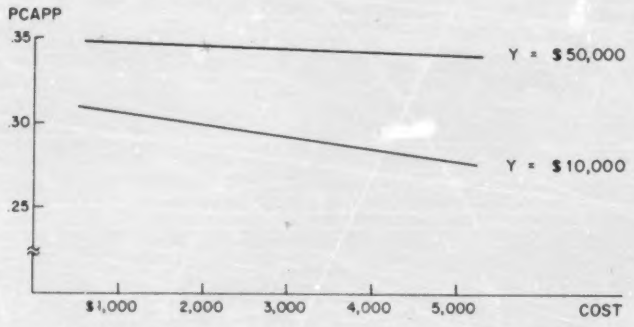
Note: SAT and quality variables are given in terms of points, not hundreds of points. We assume family income of $20,000, a school cost of $2,500, with NS of 100. Different assumptions would merely shift the curves up or down.

Even though COST was dropped from the regression, the cost of the school remains in the estimated equation as part of COST/Y. The partial derivative of PCAPP with respect to COST is $-0.0672(1/Y)$. This is precisely what one would expect. The partial derivative is negative throughout and the greater the family income, the closer it is to zero. In other words, students are less likely to apply to a school as it gets more expensive, *all other things being equal*, and high-income students are less affected by cost than their low-income counterparts.

One surprising thing about this partial derivative is its size. For Y = 10 ($10,000), it is only −0.0067. In other words, the probability of applying falls less than 1 percentage point when costs are raised $1,000. For a school costing $5,000 and a student with family income of $10,000, the price elasticity of PCAPP is only 0.12. This elasticity gets progressively smaller as income rises. For students with family incomes of $20,000 it is only 0.06, while for those in the $30,000 bracket it falls to 0.04. There is no evidence that so-called "middle-income" students are the most sensitive to changes in costs.[14] Apparently, very few students are heavily influenced by cost considerations. This is illustrated quite clearly in Figure 8.

FIGURE 8

PROPORTION OF APPLICATIONS AS A FUNCTION OF COST OF SCHOOL, BY FAMILY INCOME



Note: Variables and assumptions are the same as in Figure 6.

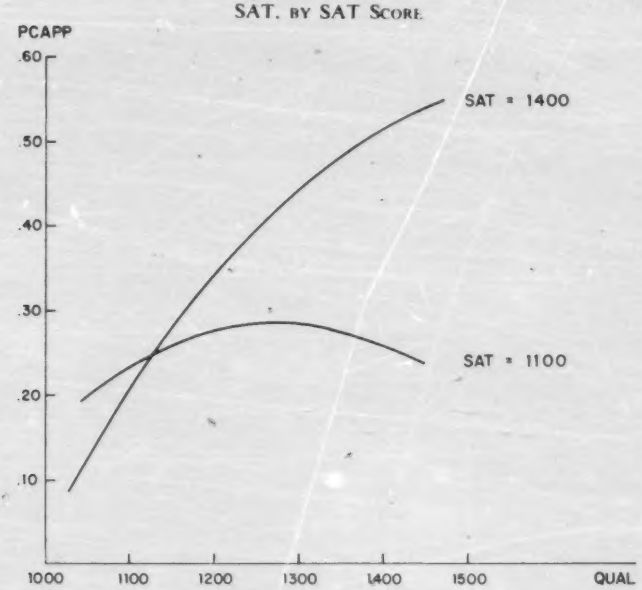
[14] It has frequently been suggested that students in the "middle-income" ranges ($15,000–30,000) are more affected by changes in costs than their high- and low-income counterparts. The rationale for this hypothesis is that these are the only students for whom an increase in cost is a real burden. The very-high-income students can easily afford an increase and the low-income students are heavily supported by financial aid anyway. We found no evidence to support this hypothesis.

The Application Decision

Figure 9 shows the effects of the quality of the school on applications. The partial derivative of PCAPP with respect to QUAL is $0.0555 + 0.0318$ (SAT $-$ QUAL). This is positive as long as SAT $-$ QUAL > -1.75, that is, as long as the student is less than 175 points below the school median. In other words, an increase in the quality of the school (or its median SAT) will result in a higher proportion of applications from all those students whose SAT scores are above that level. For students more than 175 points below the median, the probability of their applying will fall. In effect, the school would become too good for them. This is just another consequence of the applicant's attempt to find a school commensurate with his academic ability.

FIGURE 9

PROPORTION OF APPLICATIONS AS A FUNCTION OF SCHOOL MEDIAN SAT, BY SAT SCORE



Note: Variables and assumptions are the same as in Figure 7.

The main conclusion to be drawn from these results is that, of the variables we have explored, educational considerations are the primary determinants of college applications. In particular, students try to find schools that closely match their own academic abilities. Financial considerations are only secondary. Neither cost nor income has much effect on applications, although both are statistically significant. This evidence that students are making their college decisions largely on educational grounds is very encouraging.

III

APPLICATIONS TO SELECT COLLEGES

The Model

In the general application model just discussed, the only student characteristics considered were academic ability and family income. The model would have been unmanageable if all the other factors that influence college choices had been included.[1] Ability and income were chosen not only because they are the most interesting but because it seemed likely that they would be the most important determinants of applications. The purpose of this chapter is to examine the effects of other important and interesting variables, the socioeconomic characteristics of a student, on his decision whether or not to apply to a school that is both very good and very expensive.

The observations in this model are the individual students. The independent variables are the characteristics of these students — academic ability, race, sex, religion, parental education, family income and assets, etc. The dependent variable is the probability that the student will apply to a select but expensive college or university. For the purposes of this model, we have defined a "select but expensive college or university" as one that has a median SAT of 1300 or more and costs at least $4,000 a year. In Table 9 these schools made up the "43" category on the bottom right. Accordingly, we have called the dependent variable APP43. For each student, this variable will equal 1 if he applied to

[1] The number of categories increases multiplicatively. If you have two variables, each of which can assume five different values, then you have $5 \times 5 = 25$ categories. If you add a third variable with five values, the number then goes to $5 \times 5 \times 5 = 125$, and so on.

one or more schools in this category and 0 if he did not apply to any.[2]

The model to be tested is:

$$\begin{aligned}\text{APP43} = {} & b_0 + b_1\text{SAT} + b_2\text{SAT}^2 + b_3\text{Y} + b_4\text{Y}^2 \\ & + b_5\text{SAVE} + b_6\text{DEP} + b_7\text{EDUC} + b_8\text{SEX} \\ & + b_9\text{RACE} + b_{10}\text{JEW} + b_{11}\text{CATH} + u\end{aligned}$$

where APP43 = 1 if student applied to one or more schools in the "43" category
0 otherwise

SAT = student's combined SAT score in hundreds of points

Y = annual family income in thousands of dollars

SAVE = total family savings (including stocks and bonds but not the family house) in thousands of dollars

DEP = number of other dependent children in the family

EDUC = years of schooling of the parent with the higher level of education

SEX = 1 if student is female
0 if student is male

RACE = 1 if student is nonwhite
0 if student is white

[2] There are several econometric problems caused by a dichotomous dependent variable. While it is not possible to include a detailed description of those problems here, it should be noted that the use of a dichotomous dependent variable results in a very low value for the R^2, or coefficient of determination. The predicted values of the dependent variable are continuous (normally between 0 and 1), while the observed values are all either 0 or 1. Therefore, the observed value is almost never predicted exactly, even if the regression provides a perfect estimate of the probability function. This means that the sum of the squared residuals is always high. Therefore, a low R is not always an indication that the regression lacks explanatory power.

JEW = 1 if student is Jewish
0 otherwise

CATH = 1 if student is Catholic
0 otherwise

u = random error term

Several of these variables had coefficients that were not significant. Therefore, the final regression did not include SAT^2, Y^2, DEP, EDUC, SEX, and CATH.

Results

The results of the final regression are reported in Table 11. The most important determinant of whether or not a student will apply to one of these schools is his academic ability. The estimated coefficient of SAT is 0.1326. This means that an increase of 100 points in a student's SAT score would result in a 13 per cent rise in the probability of his applying, a fairly large rise. For a student who is white and a gentile, has an SAT score of 1200, a family income of $20,000, and family savings of $10,000, the elasticity of APP43 with respect to SAT is equal to 10.52. This elasticity declines as SAT rises,

TABLE 11

REGRESSION RESULTS FOR APPLICATIONS TO SELECT COLLEGES AND UNIVERSITIES

Dependent Variable: APP43

Variable	*Coefficient*	*t-Statistic*
Constant	−1.522	
SAT	0.1326	12.71*
Y	0.0034	3.69*
SAVE	0.0014	1.29
RACE	0.1401	2.13*
JEW	0.2589	7.19*

$R^2 = 0.178$

*Significant at the 95 per cent level.

but it remains quite high.[3] It is greater than 1 throughout the relevant range of SAT values. Although elasticity can be a misleading measure of a variable's importance, these results are certainly interesting. They supply further evidence that academic ability plays a very important role in the application decision. This conclusion seems even more remarkable when we recall that our sample was drawn exclusively from the top third of all college applicants.

The SAT^2 variable was included in the model in an attempt to measure any nonlinearities in the relationship between SAT and APP43,[4] but the estimate of its coefficient was not statistically significant. This is not too surprising since SAT and SAT^2 are highly correlated. However, the stepwise regression procedure we used allowed us to choose between SAT and SAT^2 (assuming that we could not pick both). In this process, the squared term was rejected.

Figure 10 gives an example of the relationship between the probability of applying and SAT score. It is interesting to compare this with the upper curve in Figure 7. These two curves measure essentially the same thing — the effect of SAT scores on the probability of applying to a select school — but they were derived differently. In the previous chapter we estimated the parameters of a general model, using broad categories of student income and ability and school cost and quality. One of the results was shown in Figure 7. In this chapter we have concentrated on one well-defined group of schools, and the student income and ability categories are much less broad. In addition, we have included several new student characteristics in our regression. As a result, this regression should give a better estimate of the relationship between APP43 and SAT. The fact that the two curves are similar can be interpreted as further support for the results

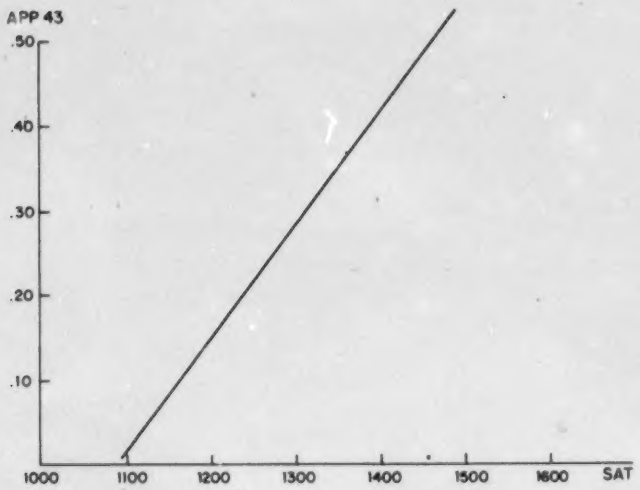
[3] For example, at SAT = 15 it is only 3.62. However, even for a Jewish student with income of $50,000 and savings of $10,000 (which increases APP43 without changing $\partial APP43/\partial SAT$), elasticity at SAT = 15 is still greater than 2.

[4] In the general model we used $(SAT - QUAL)^2$. But here QUAL is a constant, since we are considering just one class of schools. Thus $\alpha(SAT - QUAL)^2 = \alpha(SAT - k)^2 = \alpha(SAT^2 - 2k\,SAT + k^2) = \alpha SAT^2 + \beta SAT + \gamma$.

of Chapter II. The curve in Figure 10 is linear, of course, and more steeply sloped, but the differences are not great.

FIGURE 10

PROBABILITY OF APPLYING TO SELECT AND EXPENSIVE SCHOOLS AS A FUNCTION OF SAT SCORE



Note: SAT scores are given in terms of points, not hundreds of points. We assume that the student is white, a gentile, and has a family income of $20,000 and savings of $10,000. Different assumptions would merely shift the curves up or down.

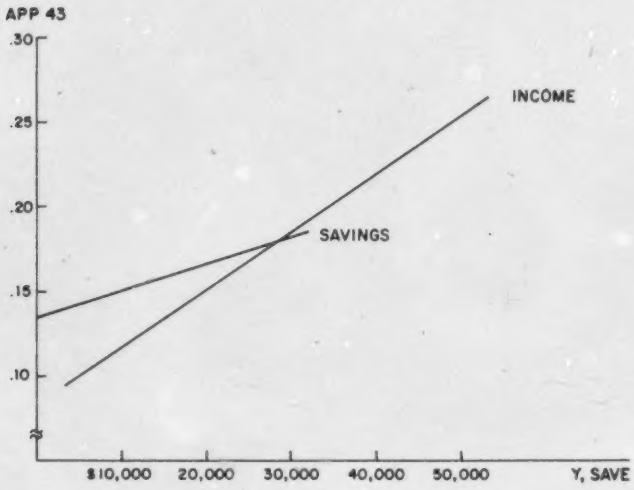
The estimated coefficient of income in this model is 0.0034. Thus the income elasticity of APP43 for the white gentile with income of $20,000, savings of $10,000, and SAT scores of 1200 is 0.45. Again, the evidence supports the hypothesis that income has a relatively small effect on students' application decisions. Although this estimate of income elasticity is considerably higher than that obtained from our earlier, more general, model, it is still very small. The estimate of b_4, the coefficient of Y^2, was not statistically significant, and

has therefore been dropped from the final regression. The implication is that the effects of income on APP43 are basically linear.

Figure 11 provides an illustration of these effects (as well as the effects of savings) on the application decision. It is again useful to compare this figure with its counterpart in the previous chapter, Figure 6. The lower curve (cost = $4,500) in that figure should be similar to the income curve in Figure 11. The only real difference between the two (besides the nonlinearity in the earlier figure) is that the more general model results in a flatter curve. In other words, this latest model implies a larger income effect than did the earlier

FIGURE 11

PROBABILITY OF APPLYING TO SELECT AND EXPENSIVE SCHOOLS AS A FUNCTION OF FAMILY INCOME AND SAVINGS



Note: Income and savings are given in dollars, not thousands of dollars. The income curve assumes savings of $10,000, while the savings curve assumes income of $20,000; both assume that the student is white, a gentile, and has an SAT score of 1200. Different assumptions would merely shift the curves up or down.

one. This has already been noted in our discussion of income elasticities. However, the new evidence still supports the basic hypothesis that the income effect is relatively small.

Although the coefficient of the savings variable was not significantly different from zero, it did have the right sign and its magnitude seemed reasonable. Because of that (and because it was the only other variable with a *t*-statistic greater than 1) it was included in the final regression. It appears that savings do increase the probability that a student will apply to one of these schools, but much less so than income. In fact, a dollar's worth of savings has the same effect as about 40 cents of annual income. Figure 11 illustrates the relationship between savings and the probability of applying. (The data originally included separate estimates of savings for education and regular savings. However, regressions in which these were entered as separate variables showed that there was no significant difference in their effects on the application decision. Therefore, the two types of savings were added together to form the variable SAVE.)

The coefficients of RACE and JEW shown in Table 11 are surprising. The estimate of 0.1401 for the coefficient of RACE means that, *all other things being equal*, blacks and other minorities are 14 percentage points more likely to apply than their white counterparts. This seems to imply a greater educational awareness on the part of these students, which could be the result of extensive recruiting of minority-group applicants by the schools in this group. While this result should be very encouraging to those who view education as a potential integrative force in our society, it should not lull anyone into complacency. The problem of ensuring that "all other things are equal" is a long way from being solved. The coefficient of JEW could be expected to be positive, but its size is surprising. It implies that Jewish students are 26 per cent more likely to apply to schools in this category, all other things being equal. This is probably due in large part to the proximity of Jewish students to these schools, most of which are located in the New England and Middle Atlantic states. The fact that Jewish families have traditionally at-

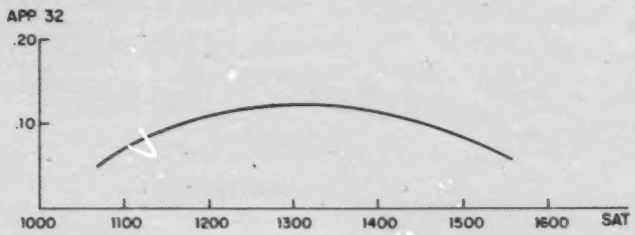
tached great importance to education is another important factor.

It is interesting to look at some of the variables that were left out of the final regression. The estimated coefficients of these variables were not statistically significant and so are not really a part of our final results. But most at least had the expected sign, and the fact that they were not significantly different from zero is itself an important finding. The positive coefficient of the Y^2 variable implies that the probability of applying not only increases with income but does so at an increasing rate. The SAT^2 variable, on the other hand, had a negative coefficient, implying a decreasing rate of increase in APP43. The positive coefficient of the number of dependent children is a little surprising: we would have expected the probability of applying to an expensive school to fall as the financial obligations of the family grew. Parental education had a positive coefficient, as expected. This just means that better-educated parents are more likely to encourage their children to apply to the best schools. Finally, the coefficients of SEX and CATH were both negative, indicating that women and Catholics are less likely to apply, all other things being equal. It should be repeated, however, that none of these coefficients was significant.

It is also interesting to compare the results described in Table 11 with those obtained by using the same model for a different group of schools. Table 12 contains the results of a regression in which the dependent variable of the model was APP32, the probability of applying to a school costing between $3,000 and $3,999 with a median SAT between 1200 and 1299. Figures 12 and 13 illustrate the effects of SAT scores and family income, respectively, on this variable. The SAT curve in Figure 12 is much flatter than in Figure 10 and even turns down at higher levels of SAT — exactly what would be expected from the results of Chapter II; students with high SAT scores are more likely to apply to the very best schools and less likely to apply to this second group. The income curves in Figures 11 and 13 are virtually identical; apparently, the income effects are similar for the two groups of schools.

FIGURE 12

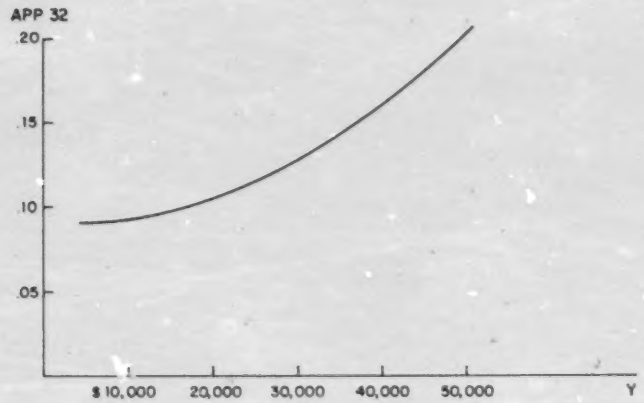
PROBABILITY OF APPLYING TO SCHOOLS IN THE "32" CATEGORY AS A FUNCTION OF SAT SCORE



Note: We assume a white male wno has no dependent brothers or sisters, is neither Jewish nor Catholic, and has a family income of $20,000.

FIGURE 13

PROBABILITY OF APPLYING TO SCHOOLS IN THE "32" CATEGORY AS A FUNCTION OF FAMILY INCOME



Note: We assume a white male who has no dependent brothers or sisters, is neither Jewish nor Catholic, and has an SAT score of 1200.

Among the other variables, the coefficients of RACE and JEW are probably the most interesting. Both coefficients are positive in both regressions, but they are much smaller in the

APP32 model, indicating that Jewish and minority-group students have a relatively greater interest in the most select (and the most expensive) schools. The fact that the coefficient of CATH shown in Table 12 is positive (and significant) can probably be attributed to the large number of Catholic colleges and universities that fall into the "32" category.

TABLE 12

REGRESSION RESULTS FOR APPLICATIONS TO COLLEGES IN THE "32" CATEGORY

Dependent Variable: APP32

Variable	*Coefficient*	*t-Statistic*
Constant	−1.615	
SAT	0.2608	1.38
SAT^2	−0.0099	1.33
Y^2	0.000045	4.19*
DEP	−0.0061	1.18
SEX	−0.0367	2.12*
RACE	0.0649	1.16
JEW	0.0723	2.33*
CATH	0.0929	4.78*

$R^2 = 0.036$

*Significant at the 95 per cent level.

IV

OTHER RESULTS

The Enrollment Decision

In Chapter II we argued that the most important decision a student makes in choosing a college (or at least a college type) is where to apply. We have therefore concentrated on the application decision throughout this study. However, students admitted to more than one college face another difficult choice — which one to attend. It would certainly be interesting to know how they make that choice. Within the framework of our models, however, there is no way to distinguish among individual schools; the most we can do is examine how students decide whether or not to attend one of the schools in a given category.

The particular model we used took the form:

$$\begin{aligned} \text{EN43} = {} & c_0 + c_1\text{SAT} + c_2\text{SAT}^2 + c_3\text{Y} + c_4\text{Y}^2 \\ & + c_5\text{SAVE} + c_6\text{DEP} + c_7\text{EDUC} + c_8\text{SEX} \\ & + c_9\text{RACE} + c_{10}\text{JEW} + c_{11}\text{CATH} + u \end{aligned}$$

where EN43 = 1 if student enrolls at a "43" college
0 if student is admitted to at least one "43" college but does not enroll at any of them

The independent variables in this model are the same student characteristics included in the APP43 model. The dependent variable is the probability that a student who has been admitted to one or more of the "43" schools (those costing $4,000 or more and with median SAT's of at least 1300) will attend one of them. Of the 190 students in our sample who were admitted to these schools, less than two-thirds (63.2 per cent) decided to enroll. In other words, even though the major decisions are made during the application process, most students still have a few options left when they come to the enrollment decision.

Other Results

In Chapter II we mentioned that the most difficult problem in an analysis of the enrollment decision is to take account of the student's alternatives. The model we have just described does not do this. It makes the assumption that if students have been admitted to the very best schools, they could have been admitted to any other school to which they applied. Thus they still have the complete range of types of school open to them. If they have not been admitted to any schools in a certain category, it is only because they had already ruled out those schools and never applied. It is obvious that this argument applies only to the most selective schools. Even though the lack of a measure of students' alternatives does not pose any serious problems in this model, it certainly would do so if we were considering a different group of schools.

The results of the final regression are reported in Table 13. Most of the estimated coefficients were not significant, and only SAT, SAT^2, and CATH were included in this regression. Even these variables were not significant at the 95 per cent level, but they at least had *t*-statistics greater than 1. This lack of significance is itself an important finding, illustrating vividly the problems inherent in trying to explain enrollment decisions. The probability of enrolling climbs sharply with the level of ability, at least over the lower ranges of SAT. In

TABLE 13

REGRESSION RESULTS FOR ENROLLMENT AT SELECT COLLEGES AND UNIVERSITIES

Dependent Variable: EN43

Variable	*Coefficient*	*t-Statistic*
Constant	−8.565	
SAT	1.2910	1.62
SAT^2	−0.0446	1.49
CATH	−0.0935	1.15

$R^2 = 0.068$

*Significant at the 95 per cent level.

other words, even students admitted to the most select schools are reluctant to attend a school where they will be well below the average in academic ability. The partial derivative of EN43 with respect to SAT is $1.2910 - 0.0892$ SAT. This derivative actually becomes negative for very high values of SAT (SAT $\geqq$ 14.47), but very few students had scores in this range. It seems reasonable to suppose, however, that there is some level (probably around 1400) above which an increase in SAT score does not result in an increase in the probability of enrolling. For students in this range, no school seems too good.

The only other variable that approached significance in the regression was CATH. Again the coefficient was negative. The probable explanation here is that most Catholic colleges fall into other categories. Students who want to attend a Catholic school are thus less likely to enroll at a "43" school.

Finally, note that none of the financial variables was even close to significance. This implies that students are not swayed by financial considerations when they are deciding whether or not to attend one of these schools.

Since we were unable to obtain data on the financial-aid offers made to the students in our sample by the colleges that admitted them, we could not measure the effect of financial-aid policies on the enrollment decision. In the absence of such data, we hypothesized that both high- and low-income students would be more likely to enroll at a "43" school than would those in the middle-income range. Our reasoning was that high-income students are not concerned with cost, while low-income students receive financial aid. In an attempt to test this hypothesis, we included both Y and Y^2 in the regression. However, neither coefficient was significantly different from zero and the hypothesis was rejected. This is the same conclusion we reached earlier in our analysis of the application decision.

The Effects of the Distribution of Financial Aid

Using a completely unrelated set of data, we were able to examine the question of financial aid more closely. In par-

ticular, we were able to look at the effects on the student's enrollment decision of varying the amounts of scholarship and self-help. These data referred to the financial-aid offers (including their distribution between scholarship and self-help) made by three schools to the same group of students. All three schools are in the "43" category and have traditionally had many applicants in common. The students in the sample were all admitted and offered financial aid at the first school and at one or both of the other two. Only students who enrolled in one of the three schools were included in the sample, a total of 153.

Among the problems with these data was that the schools frequently did not report loans and job offers separately, so that a single self-help variable had to be used. Another more serious problem was that the three schools made an effort to keep their financial-aid offers the same. In fact, they made virtually identical offers in terms of the total financial-aid package. The same is not quite true of the scholarship and self-help components of those offers, however, which often differed. Therefore, we were able to get an estimate of the effects of the distribution of the offer on the enrollment decision, even if we could not say anything about the total package.

These data were used in the estimation of the following model:

$$\text{ENA} = \alpha_1 \text{BC} + \alpha_2 \text{B} + \alpha_3 \text{C} + \alpha_4 \text{SAB} + \alpha_5 \text{SAC} + u$$

where ENA = 1 if student enrolls at college A
0 if student enrolls at college B or C

BC = 1 if student was admitted to all three colleges
0 otherwise

B = 1 if student was admitted to A and B but not C
0 otherwise

C = 1 if student was admitted to A and C but not B
0 otherwise

Other Results

SAB = 0 if student was not admitted to B
(scholarship offer from A − scholarship offer from B) ÷ (ability to pay)[1] otherwise

SAC = 0 if student was not admitted to C
(scholarship offer from A − scholarship offer from C) ÷ (ability to pay) otherwise

The three variables BC, B, and C are dummies that indicate the student's alternatives.[2] The remaining two variables measure his relative financial-aid offers. Since total financial-aid packages were highly correlated across schools, the scholarship component is used as the sole measure of relative financial-aid offers. It must therefore be remembered that an increase in A's scholarship offer relative to B's implies an equal decrease in A's relative self-help offer.

The most striking feature of our results, as reported in Table 14, is that neither financial-aid variable is statistically significant. In fact, the variable for school B even appears

TABLE 14

REGRESSION RESULTS FOR ENA

Dependent Variable: ENA

Variable	*Coefficient*	*t-Statistic*
BC	0.1080	1.55
B	0.3034	3.93*
C	0.3580	6.59*
SAB	−0.0107	0.13
SAC	0.1385	1.10

$R^2 = 0.0659$

*Significant at the 95 per cent level.

[1] Ability to pay is determined by the College Scholarship Service on the basis of family income, assets, number of dependent children, etc.

[2] No constant was included because every student in the sample was admitted to school A and one or both of the other two. Therefore, the three dummy variables BC, B, and C are exactly collinear with a constant.

with the wrong sign; the negative sign on the coefficient of SAB implies that as school A's scholarship offer increases relative to B's, the probability that the student will enroll at A actually decreases. Because the total packages are so highly correlated, however, the nonsignificant coefficients of SAB and SAC imply only that a student's enrollment decision is not influenced by the *distribution* of his financial-aid offers between scholarships and self-help. This is not the same as saying that a difference in the total package would not influence his decision.

The coefficients of the dummy variables indicate that if the financial-aid offers are identical, the probability of a student's enrolling at A is 0.3580 if his only alternative is C, or 0.3034 if it is B. Finally, that probability is 0.1080 if he was admitted to all three schools.

We tried several other forms of the financial-aid variable besides the one actually used — the difference in scholarship offers divided by the student's ability to pay. These were (a) adjusting the scholarship offers to account for the differences in costs among the three schools, (b) using both the differences in offers and these adjusted differences without dividing by ability to pay, and (c) using the ratio of the scholarship offers. The results were substantially the same in every case. Thus, though the choice of a particular form was somewhat arbitrary, it does not affect our conclusions.

One further caveat should be added. Despite the apparent lack of standardization of distribution, the differences in scholarship offers were seldom very large. Therefore, the range of values assumed by the independent variables in this regression was fairly limited. Since it is dangerous to use regression analysis to predict what would happen if the variables assumed values outside the range of the sample, we cannot really predict the effects of a major change in financial-aid policies. The only conclusion we can draw on the basis of this regression is that small differences in the distribution of a given financial-aid offer between scholarship and self-help have no significant effect on a student's enrollment decision.

Other Results

The Decision to Apply for Financial Aid

It seemed reasonable to suppose that a student who thinks he is eligible for a scholarship or other financial aid will be less concerned about college costs and will therefore apply to different kinds of schools from his friend who expects to pay the full costs. Yet our attempts to incorporate these considerations into our applications models were all rejected. We could not find any significant relationship between the application decision and the decision to seek financial aid.

Even though we were not able to determine how financial aid affects the application decision, we were able to examine the financial-aid decision by itself. We can build a model to explain how students decide whether or not to apply for financial aid:[3]

$$\begin{aligned}\text{APPAID} = {} & d_0 + d_1\text{SAT} + d_2\text{SAT}^2 + d_3\text{Y} + d_4\text{Y}^2 \\ & + d_5\text{SAVE} + d_6\text{D}^{\text{EP}} + d_7\text{EDUC} + d_8\text{SEX} \\ & + d_9\text{RACE} + d_{10}\text{JEW} + d_{11}\text{CATH} + d_{12}\text{COST} \\ & + d_{13}\text{COST}^2 + d_{14}\text{SCHOL} + u\end{aligned}$$

where APPAID = 1 if student applied for financial aid from a college
0 if student applied for admission at the college but did not apply for aid

COST = cost of attending that college in thousands of dollars

SCHOL = number of students receiving scholarship aid from the college as a percentage of full-time equivalent students

The first eleven independent variables are the same student characteristics included in the APP43 and EN43 models. The others are measures of the need for aid at a particular school and the likelihood of getting it. All but SAT, EDUC, CATH, and

[3] We will consider only financial aid from the colleges. (Many students also get assistance from other sources, such as state governments, private foundations, and corporations.)

COST^2 were significant. The results of this regression are reported in Table 15.

TABLE 15

REGRESSION RESULTS FOR FINANCIAL-AID APPLICATIONS

Dependent Variable: APPAID

Variable	*Coefficient*	*t-Statistic*
Constant	0.181	
SAT^2	0.0024	4.67*
Y	−0.0302	8.52*
Y^2	0.0003	4.63*
SAVE	−0.0039	3.10*
DEP	0.0409	5.52*
SEX	0.0783	3.14*
RACE	0.1262	1.58
JEW	−0.0533	1.18
COST	0.0779	5.73*
SCHOL	0.1911	1.84

$R^2 = 0.247$

*Significant at the 95 per cent level.

The positive coefficient of SAT^2 means that students with high SAT scores are more likely to apply for financial aid. The reason for this is that many schools award scholarships on the basis of merit as well as need. It may also be true that high school guidance counselors spend more time with gifted students and urge them to apply for scholarships. The effect of income on APPAID is clear — the higher the income the less likely a student is to apply for aid. Savings also reduce the likelihood of an application for aid but by a much smaller amount.

Not surprisingly, the other student characteristics have smaller effects on APPAID, since the decision whether or not to apply for aid is basically a financial one. However, some do have significant coefficients. The number of dependent children has a positive effect, but DEP is really just another measure of financial position. Women and minority-group students are more likely to apply for aid, all other things being equal.

Jewish students, on the other hand, are less likely to do so. Finally, the higher the cost of attending school, the more likely students are to seek aid. In addition, students are somewhat influenced by the school's financial-aid policies. They are slightly more likely to apply for aid at schools where a high percentage of students are receiving scholarships.

V

FUTURE APPLICANT POOLS: SOME SIMULATIONS

The most surprising — and probably the most significant — finding of this study is that financial considerations seem to have a relatively small effect on student decisions. The major determinants of a student's college choice are his academic ability and the quality of the schools he is considering. The implications of this finding for the private colleges and universities are fairly obvious. Despite their rapidly rising costs, these schools are apparently in no immediate danger of being priced out of the market. As long as they can maintain their standards of educational excellence, they will continue to attract large numbers of applicants from a wide variety of socioeconomic groups.

Despite this note of optimism, it should be pointed out that the era of rapid growth has ended, at least temporarily, for all higher education. Because of significant changes in birth rates over the last two decades, the growth of the college-age population will be much slower in the 1970's and is expected to decline in the 1980's. As a result, all colleges are going to face increased competition for students. The select private colleges are no exception.

Using the model developed in Chapter II, it is possible to predict the effects of future cost increases on the applicant pool for the "43" schools. In Table 16 the number of applicants is projected through 1980 using three different assumptions about costs. The first column shows the number of eighteen-year-olds in each year, the group from which most college applications can be expected to come. The second column, labeled "Qualified Students," is an estimate of the number of students who will have SAT scores of 1100 or

more.[1] The last three columns are estimates of the number who can be expected to apply to at least one "43" school under different assumptions about costs. These estimates were derived from the results reported in Table 10. We assumed that NS = 30, the actual number of schools in our "43" category, and that QUAL = 1350. We also assumed that all students had SAT scores of 1226, the average for the students in our sample.[2] The students were then divided into nine income groups at intervals of $5,000. Every student in the group was assumed to have an income equal to the midpoint of that interval, and incomes were assumed to grow at 5 per cent per year. Finally, costs were put at $4,500. Using three different rates of growth of costs, the number of applicants from each group was computed for each year. These were then added together to get the totals for each year.

A number of interesting conclusions can be drawn from Table 16. The most striking is that differences in cost have very little effect on the applicant pool. Let us suppose that colleges are committed to keeping costs down and allow them to grow at only 3 per cent a year. It appears that these schools would not attract many more applicants than if their costs

[1] This number is simply .15 times the number of eighteen-year-olds. In deriving this estimate we assumed that 50 per cent of all eighteen-year-olds go to college (see *New Students and New Places*, Carnegie Commission Report, McGraw-Hill, New York, 1971, pp. 13–15). In addition, about 30 per cent of those who take SAT's receive scores of 1100 or higher. Therefore, it seems reasonable to assume that .50 × .30, or 15 per cent, of all eighteen-year-olds are in this pool. Even a rise in enrollment rates over the next ten years should not have much effect on our 15 per cent estimate. Most students in this quality range already go to college. Therefore, an increase in the number of students taking SAT's will probably not mean an increase in the number scoring 1100.

[2] To the extent that the effect of SAT on PCAPP is nonlinear, this is an inappropriate assumption. Instead, we should have divided the students into SAT groups and computed the number of applications from each group separately. We did not do this because of the computation problems involved. The differences were quite small in any case and did not vary as the financial variables changed. Given the grossness of some of the other assumptions used in the calculations, the cost of redoing them seemed to outweigh any gain that might result from a slight improvement in their precision.

Future Applicant Pools

TABLE 16

APPLICANT POOL FOR SELECT COLLEGES
(*000 omitted*)

Year	18-Year-Olds	Qualified Students	Applicants, with Increasing Annual Costs of 3%	5%	7%
1971	3,847	577.1	140.0	140.0	140.0
1972	3,926	588.9	143.8	143.5	143.4
1973	4,030	604.5	148.3	147.8	147.3
1974	4,057	608.6	150.0	149.3	148.5
1975	4,168	625.2	155.0	154.0	153.0
1976	4,187	628.1	156.8	155.5	154.2
1977	4,204	630.6	158.3	156.9	155.3
1978	4,207	631.1	159.4	157.7	155.8
1979	4,344	651.6	165.9	163.8	161.2
1980	4,254	638.1	163.6	161.4	158.5
1985	3,625	543.8	144.5	141.8	138.1
1990	3,723	558.5	154.6	151.0	145.7

were rising at 7 per cent. Since colleges have expenses that, by their very nature, tend to go up faster than the general level of prices, this is very encouraging. It means that students will continue to pay those costs. We should point out, however, that this does not imply that every school can charge its students whatever it wants. First of all, the assumption in Table 16 is that all the schools in "43" group will have the same cost increases. If any one school in this group tried to charge much more than the others, it would undoubtedly lose some applicants. Second, we must repeat our earlier warning about using regressions to predict what would happen if the independent variables assumed values outside the range of the original sample. In Table 16 we have used values of both cost and income much larger than any in our sample. Therefore, these predictions should be viewed with a great deal of caution.

Another point to note about Table 16 is that changes in income have more effect on the applicant pool than changes in cost. This should have been obvious from our discussion of the partial derivatives in Chapter II. But Table 16 m[illegible]es it

even clearer. Even when we combine cost increases of 7 per cent with income increases of 5 per cent, the result is a growing applicant pool.

Finally, it is clear from Table 16 that the most important determinant of the size of the applicant pool is the number of eighteen-year-olds. Even if costs go up only 3 per cent a year, the select schools face a decline in the number of applications in the 1980's. The same is also true of schools in the other categories. We are assuming, of course, that the number of eighteen-year-olds accurately reflects the number of potential applicants. If colleges make a concerted effort to recruit more applicants from other age groups, these estimates would obviously be affected.

It is interesting to see what happens to the income distribution of the applicant pool in the face of rising costs. It has often been suggested that either low- or middle-income students (or both) are being driven out of the select private schools by the large increases in costs. There is absolutely no evidence for such a phenomenon in these data. On the contrary, our results indicate that the income distribution of the applicant pool will remain quite stable. Table 17 shows the income distributions of future pools if costs increase at a 7 per cent rate (a not unrealistic assumption) while family incomes go up only 5 per cent per year. Although we should not attach much significance to the year-to-year changes, the overall pattern is revealing. While it is clear that high-income students take a disproportionate share of the new places in the pool, the shift is very small. In 1980 there will actually be more low-income (under $10,000) students in the pool than there are in 1971, and their share of the total pool will have fallen less than 1 percentage point.

These results should not lull us into complacency. Low-income students are underrepresented in our select colleges and universities. Our results indicate that they will become more underrepresented in the future, even if only slightly. We can, and should, work to correct this situation. The first and most important task is to increase the number of low-income students in the pool of potential applicants — those

TABLE 17

INCOME DISTRIBUTION OF APPLICANT POOLS
(000 omitted)

	Total	*Under $10,000*[a]	*$10,000–19,999*	*$20,000–29,999*	*$30,000–39,999*	*$40,000 and Over*
1971	140.0	17.9 (12.8)	63.7 (45.5)	30.1 (21.5)	13.6 (9.7)	14.7 (10.5)
1972	143.4	18.3 (12.7)	65.2 (45.5)	30.8 (21.5)	14.0 (9.8)	15.1 (10.5)
1973	147.3	18.6 (12.6)	66.9 (45.4)	31.8 (21.6)	14.4 (9.8)	15.6 (10.6)
1974	148.5	18.7 (12.6)	67.4 (45.4)	32.0 (21.6)	14.6 (9.8)	15.8 (10.6)
1975	153.0	19.1 (12.5)	69.4 (45.4)	33.1 (21.6)	15.1 (9.9)	16.3 (10.6)
1976	154.2	19.1 (12.4)	69.9 (45.3)	33.3 (21.6)	15.2 (9.9)	16.7 (10.8)
1977	155.3	19.1 (12.3)	70.2 (45.2)	33.7 (21.7)	15.5 (10.0)	16.8 (10.8)
1978	155.8	19.1 (12.3)	70.3 (45.1)	33.9 (21.8)	15.5 (9.9)	17.0 (10.9)
1979	161.2	19.2 (12.0)	72.9 (45.2)	35.1 (21.8)	16.2 (10.0)	17.8 (11.0)
1980	158.5	18.9 (11.9)	71.5 (45.1)	34.6 (21.8)	15.9 (10.1)	17.6 (11.1)
1985	138.1	16.0 (11.6)	61.7 (44.7)	30.3 (21.9)	14.2 (10.3)	15.9 (11.5)
1990	145.7	16.2 (11.1)	64.5 (44.3)	32.3 (22.2)	15.3 (10.5)	17.4 (11.9)

[a]The income ranges are expressed in 1971 terms. Since incomes are assumed to grow at 5 per cent per year, in future years students in the "Under $10,000" category may have incomes appreciably greater than $10,000.

NOTE: Figures in parentheses are percentages of total applicant pool.

who have the academic qualifications for these schools. Then we must provide some means of helping them, and others, pay the increasing costs. The main conclusion of this study is that most students are willing to pay a great deal for a superior education. The question is: How much should we ask them to pay?

APPENDIX A

SCHOOLS INCLUDED IN THE ANALYSIS OF HISTORICAL DATA

Private I and Private II Colleges and Universities

Amherst College
Barnard College
Bucknell University
California Institute of Technology
Carleton College
Chicago, University of
Claremont Men's College
Colgate University
Columbia University
Cornell University
Dartmouth College
Denison University
Georgetown University
Harvard University
Harvey Mudd College
Haverford College
Johns Hopkins University
Lake Forest College
Massachusetts Institute of Technology
Middlebury College
Mount Holyoke College
New York University
Northwestern University
Pennsylvania, University of
Pomona College
Princeton University
Radcliffe College
Reed College
Rensselaer Polytechnic Institute
Rochester, University of
Smith College
Stanford University
Swarthmore College
Trinity College
Vassar College
Washington University
Wellesley College
Wells College
Wesleyan University
Wheaton College
Williams College
Yale University

State Universities

Connecticut, University of (Storrs)
Indiana University (Bloomington)
Massachusetts, University of (Amherst)
Michigan, University of (Ann Arbor)
Minnesota, University of (Minneapolis)
North Carolina, University of (Chapel Hill)
Pennsylvania State University (University Park)
Rutgers University — Douglass College
Rutgers University — Rutgers College
Virginia, University of (Charlottesville)
Washington, University of (Seattle)
Wisconsin, University of (Madison)

APPENDIX B

SAMPLING PROCEDURE

The sampling procedure for the national survey was designed by the Opinion Research Corporation, with the help of the College Entrance Examination Board and Educational Testing Service. The basic sample was developed from the College Board's file of 1970–71 high school seniors who had achieved combined Scholastic Aptitude Test verbal and math scores of 1100 or more. From this file the College Board randomly selected the names of 3,100 individuals. The parents of these individuals were sent a questionnaire together with a covering letter explaining the purpose of the survey and the procedure they were to follow. They were also provided with a postage-paid return postcard they could use to indicate that they did not wish to participate in the survey.

From the 3,100 letters sent out, 1,452 completed questionnaires and 189 refusal postcards were received. The 1,452 completed questionnaires comprised the mail portion of the sample. The telephone sample was developed from those individuals whose parents did not return either a completed questionnaire or the postcard. A separate list of these people was prepared and the telephone number of every third person on this list obtained. As the agreed-upon number of interviews (1,200) had been obtained in the mail portion of the survey, the purpose of obtaining the telephone surveys was to provide a check on the possible bias of self-selection in the mail portion of the sample. For this reason, a limit of 200 telephone interviews was established. As it was, 203 telephone interviews were completed. There were no discernible differences between those interviewed by telephone and the mail portion of the sample.

APPENDIX C

SURVEY QUESTIONNAIRE

Please read the questions carefully. Please answer the questions by circling the number in front of the appropriate answer or, where the question calls for a written answer, by writing your answer in the space provided.

Your responses will be completely confidential. Your answers will be used for statistical purposes only and your name will never be used in the reporting of the results.

1. Did your child apply to college?
   1 Yes
   2 No → PLEASE RETURN THIS QUESTIONNAIRE. THANK YOU FOR YOUR COOPERATION.

2. Please list all the colleges to which your child applied.

NAME	LOCATION	*Q. 3*
_____	_____	1
_____	_____	2
_____	_____	3
_____	_____	4
_____	_____	5
_____	_____	6

3. Please circle the number next to the name of each college at which your child was accepted for admission.

IF YOUR CHILD IS ATTENDING COLLEGE THIS FALL, PLEASE SKIP TO QUESTION 5.
IF YOUR CHILD IS NOT ATTENDING COLLEGE THIS FALL, PLEASE PROCEED TO QUESTION 4.

4. Why is your child *not* attending college this fall?

PLEASE SKIP TO Q. 12

5. What college is your child attending this fall?

NAME	LOCATION

6. Was this his/her first choice? 1 Yes 2 No

7. How far is this college from your home? 1 Less than 25 miles 2 25–99 miles 3 100–499 miles 4 500 miles or more

8. Will your child be living . . 1 At home 2 Away from home

Now some questions about your child's choice of a college.

9. Why did your child choose the college he/she is attending this fall?

10. Please circle the number which shows how important *each* of these factors was in your child's selection of a college.

	Very Important	*Fairly Important*	*Not Important*	*Don't Know*
a. The college's over-all reputation	1	2	3	4
b. Your child's desired field of study	1	2	3	4
c. The cost of tuition, room, and board	1	2	3	4
d. The size of the college	1	2	3	4
e. The distance of the college from your home	1	2	3	4
f. The type of setting or section of country	1	2	3	4
g. The advice of school counselors and other adults	1	2	3	4
h. An offer of financial assistance	1	2	3	4
i. The advice of other young people	1	2	3	4

11. Will your child receive any financial support in the form of a scholarship, loan, or job? (Please circle as many as apply.)
    1 Yes, a scholarship
    2 Yes, a loan
    3 Yes, a job
    4 None of these

12. Did your child file an application for financial aid at any colleges to which he/she applied?
    1 Yes → PLEASE GO TO Q. 13
    2 No → PLEASE SKIP TO Q. 14

13. Please list the colleges to which your child applied for financial aid.

NAME	LOCATION

14. Have you been saving for your child's education?
    1 Yes → PLEASE GO TO Q. 15
    2 No → PLEASE SKIP TO Q. 17

15. Is this money part of your regular savings or did you set money aside specifically for your child's education?
    1 Part of regular savings → PLEASE SKIP TO Q. 17
    2 Savings specifically for education → PLEASE GO TO Q. 16

16. What is the total amount of this savings for education?
    1 Under $1,000
    2 $1,000–$4,999
    3 $5,000–$9,999
    4 $10,000–14,999
    5 $15,000–$19,999
    6 $20,000 or more

17. What is the total amount of your regular savings, including stocks and bonds?
    1 Under $1,000
    2 $1,000–$4,999
    3 $5,000–$9,999
    4 $10,000–$14,999
    5 $15,000–$19,999
    6 $20,000 or more

18. What other sources of financial support for college, if any, does your child have?

Now some background questions about your family.

19. What is your relationship to the child whose name appears on the back of this questionnaire?
    1 Mother
    2 Father
    3 Legal Guardian (Female)
    4 Legal Guardian (Male)
    5 Other (specify)
    _____

20. Did your child attend a public or private high school?
    1 Public
    2 Private-Independent
    3 Private-Parochial

21. Is your child married?
    1 Yes
    2 No

22. Do you have any other dependent children?
    1 Yes
    2 No → PLEASE SKIP TO Q. 25

23. How many other dependent children do you have?_____

24. How many of them, if any, are attending college this fall?_____

25. What was the highest level of education that you completed?
    1 8th grade or less
    2 Grades 9, 10, or 11 (high school incomplete)
    3 Grade 12 (high school complete)
    4 Some college
    5 College graduate
    6 Some graduate or professional school
    7 Graduate or professional school complete

26. From what college did you receive your bachelor's degree?

NAME	LOCATION

27. What was the highest level of education that your spouse completed?
    1 8th grade or less
    2 Grades 9, 10, 11 (high school incomplete)
    3 Grade 12 (high school complete)
    4 Some college
    5 College graduate
    6 Some graduate or professional school
    7 Graduate or professional school complete

28. From what college did your spouse receive his/her bachelor's degree?

NAME	LOCATION
_____	_____

29. Are you currently employed? 1 Yes 2 No

30. Whether or not you are currently employed, what is your usual occupation?

31. Is your spouse currently employed? 1 Yes 2 No

32. Whether or not your spouse is currently employed, what is his/her usual occupation?

33. Do you own or rent the house or apartment you are currently living in? 1 Own 2 Rent → PLEASE SKIP TO Q. 36

34. What is the market value of your house or apartment?

    1 Under $10,000
    2 $10,000–$19,999
    3 $20,000–$29,999
    4 $30,000–$49,999
    5 $50,000–$99,999
    6 $100,000 or more

35. How many years have you owned this house or apartment?

    _____

36. What is your religious preference?
    1 Protestant
    2 Catholic
    3 Jewish
    4 Other (Please specify)_____

37. What race are you?

1 American Indian
2 Black or Afro-American or Negro
3 Mexican-American or Chicano
4 Oriental or Asian-American
5 Puerto Rican or Spanish-speaking American
6 White or Caucasian
7 Other (specify)_____

38. What was your total family income before taxes in 1970?

1 Under $3,000
2 $3,000–$4,999
3 $5,000–$7,499
4 $7,500–$9,999
5 $10,000–$14,999
6 $15,000–$19,999
7 $20,000–$24,999
8 $25,000–$29,999
9 $30,000–$34,999
10 $35,000–$39,999
11 $40,000–$49,999
12 $50,000 or more

THANK YOU VERY MUCH FOR YOUR COOPERATION.

PLEASE RETURN THIS QUESTIONNAIRE IN THE ENCLOSED ENVELOPE.